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Public and patient perceptions of different diagnostic labels for rotator cuff disease: a content analysis

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ABSTRACT

Objectives: Explore how people perceive different labels for rotator cuff disease in terms of words or feelings evoked by the label and treatments they feel are needed. **Setting:** We performed a content analysis of qualitative data collected in a six-arm, online randomised controlled experiment.

Participants: 1,308 people with and without shoulder pain read a vignette describing a patient with rotator cuff disease and were randomised to one of six labels: *subacromial impingement syndrome, rotator cuff tear, bursitis, rotator-cuff-related shoulder pain, shoulder sprain* and *episode of shoulder pain*.

Primary and secondary outcomes: Participants answered two free-text response questions about: 1) words or feelings evoked by the label; 2) what treatments they feel are needed. Two researchers iteratively developed a coding framework to analyse responses. **Results:** 1,308/1,626 (80%) complete responses for each question were analysed. Psychological distress (21%), uncertainty (22%), serious condition (15%), and poor prognosis (9%) were most often expressed by those labelled with *subacromial impingement syndrome*. For those labelled with a *rotator cuff tear,* psychological distress (13%), serious condition (9%) and poor prognosis (8%) were relatively common, while minor issue was expressed least often compared to the other labels (5%). Treatment/investigation and surgery were common among those labelled with a *rotator cuff tear* (11% and 19%, respectively) and *subacromial impingement syndrome* (9% and 10%) compared to *bursitis* (7% and 5%).

Conclusions: Words or feelings evoked by certain labels for rotator cuff disease and perceived treatment needs may explain why some labels drive management preferences towards surgery and imaging more than others.

Key words: rotator cuff; shoulder pain; subacromial impingement; bursitis; labelling.

Strengths and limitations of the study

- Our study used a large sample size and a highly reliable coding framework (k=0.90 to 0.97 across labelling groups for both questions)
- The online experiment which provided data for this study used high-quality methods (e.g. randomisation, allocation concealment)
- Since this is an online experiment, people's feelings towards different labels and what treatments they feel are needed might be different in a real-life clinical encounter
- Other labels not investigated in this study (e.g. rotator cuff disease, painful arc syndrome) may have provoked different words or feelings and perceived treatment needs
- We only focused on the feelings and needs of patients and the public, whereas clinician-related factors (e.g. beliefs, bias) might be a stronger driver of management choices in real-life

1. Introduction

Shoulder pain is the third most common musculoskeletal condition seen in primary care [1]. The one-year and lifetime prevalence of shoulder pain ranges from 5-47% and 7-67%, respectively [2]. Rotator cuff disease, an umbrella term that encompasses conditions relating to the rotator cuff and surrounding structures (including rotator cuff tendinopathy and tears, calcific tendinitis and subacromial bursitis) accounts for 85% of cases of shoulder pain [3]. Other causes of shoulder pain include adhesive capsulitis, glenohumeral osteoarthritis, fracture, dislocation and instability, malignancy and referred pain from visceral causes [4].

Neither clinical features nor diagnostic imaging can reliably pinpoint a specific nociceptive cause of rotator cuff disease from the numerous candidate pain-sensitive structures in the shoulder (e.g. tendon, bursa) [5-11]. Possibly as a result of such uncertainty, there are a plethora of diagnostic labels that have been used in both routine practice and research to indicate the same condition [12]. Some labels describe the clinical features (e.g. painful arc syndrome), the purported or observed pathology (e.g. rotator cuff tear), or the presumed aetiology (e.g. subacromial impingement syndrome).

Different labels for the same condition can influence people's management preferences, psychological outcomes and perceptions of condition severity [13]. For example, we recently conducted a large online randomised controlled experiment in people with and without shoulder pain (n=1,308) to explore whether different labels for rotator cuff disease influence people's management preferences. People told they had a *rotator cuff tear* had higher perceived need for both surgery and imaging compared to those told they had *bursitis*, and those told they had *subacromial impingement syndrome* had higher perceived need for imaging compared to those told they had *bursitis* [14].

Shoulder surgeries such as subacromial decompression and rotator cuff repair [15-20] are frequently performed for patients with rotator cuff disease [15-18], but current evidence indicates these procedures are not superior to placebo or non-operative management [19, 20]. Diagnostic imaging is also unnecessary for most patients with rotator cuff disease because it cannot reliably identify a specific nociceptive cause of rotator cuff disease, it does not inform management decisions, and can encourage use of surgery by identifying 'incidentalomas'[7-11]. Despite this, clinicians frequently order imaging [21, 22]. Our trial identified labels for rotator cuff disease that reduce people's perceived need for shoulder surgery and imaging. These findings could be an important starting point for reducing unnecessary healthcare for shoulder pain.

As part of our online randomised controlled experiment [14], we collected qualitative data that could help to uncover why preferences differed based upon the diagnostic label people received. For example, an explanation for why people labelled with a *rotator cuff tear* had higher perceived need for surgery may be that they perceived a tear as something that needs to be fixed. Similarly, people labelled with *subacromial impingement syndrome* may have had higher perceived need for imaging because they thought it was important to uncover the cause of the impingement so it can be fixed. The aim of this study was to explore how people with and without shoulder pain in our online experiment perceived different labels for rotator cuff disease in terms of words or feelings evoked by the label and treatments they feel are needed.

2. Materials and methods

2.1. Study design

We performed a content analysis of qualitative data collected in a six-arm, online randomised controlled experiment in participants with and without shoulder pain [14]. The study was

approved by the University of Sydney Human Research Ethics Committee (Reference number: 2020/159).

2.2. Participants and recruitment

Participants aged 18-65 years old from Australia, New Zealand, United States, United Kingdom, and Canada were recruited through Qualtrics (www.qualtrics.com) between April and June 2020. Participants were evenly distributed across three groups: those who had never experienced shoulder pain, those who had shoulder pain at the time of participation, and those who had previously experienced shoulder pain but were pain-free at the time of participation. Qualtrics uses existing, nationally representative panels of individuals who have previously agreed to complete surveys. Qualtrics employs random sampling and provides incentives for participants to complete surveys (e.g. cash, airline miles, gift cards). Details on the sampling and recruitment procedures Qualtrics use are reported elsewhere [23].

2.3. Data collection

Participants provided data on demographics, and if applicable, healthcare utilization and shoulder symptoms. This included data on age, gender, educational attainment, country of residence, employment status, private health insurance status, symptoms of anxiety and depression, history of shoulder pain, history of diagnostic imaging for shoulder pain (X-ray, ultrasound, MRI), history of injections for shoulder pain, history of shoulder surgery, history of sick leave due to shoulder pain, history of receiving a diagnosis for shoulder pain, duration of current shoulder pain, and shoulder pain and disability index (SPADI) scores. Detail on how these data were collected are reported elsewhere [14].

Participants read a vignette describing a patient with rotator cuff disease and were randomised to one of six labels. Each label was accompanied by a brief explanation of the label:

- "Subacromial impingement syndrome. Subacromial impingement syndrome describes shoulder pain caused by compression of soft tissue (e.g. tendons, bursa) from bony parts of the shoulder."
- "Rotator cuff tear. A rotator cuff tear is a tear in one of the shoulder tendons."
- "Bursitis. Bursitis is inflammation of a fluid-filled sac called a bursa in the shoulder."
- "Rotator-cuff-related shoulder pain. Rotator-cuff-related shoulder pain describes shoulder pain caused by an injury to one of the shoulder tendons."
- "Shoulder sprain. Shoulder sprain describes shoulder pain caused by a sprain of either muscles, ligaments and/or tendons that support the shoulder."
- "Episode of shoulder pain" (control label; no explanation provided).

In the vignette, the health professional described all labels as non-serious and likely to resolve over time (Box 1).

Box 1. Vignette.

You have shoulder pain

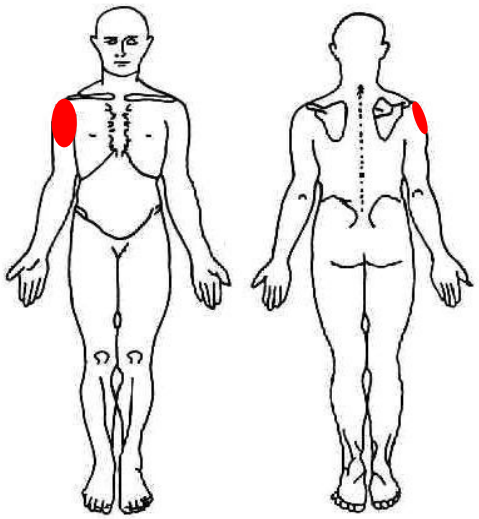
This next section describes a person with shoulder pain who goes to a health care provider.

We want you to put yourself into this scenario, and do your best to imagine that you are the person having this shoulder pain.

After reading it, you will be asked a number of questions. Please do your best to answer them based on this imagined scenario.

Your shoulder pain

- **Imagine you are suffering from pain in your right shoulder**
- It started 2 months ago
- There was no specific incident/injury/trauma that caused your pain
- You think the pain was triggered by reaching for a plate in a high cupboard, but you are not sure
- You have no pain or other unusual sensations past your shoulder (e.g. pins and needles, numbness)
- The pain is at the front, side and back of your right shoulder and right upper arm, as shown by the **red circles on the picture of the body chart below**
- You find it hard to move your shoulder normally. In particular, you find it very hard to lift your right arm past horizontal ('eye level') and reach up to high cupboards
- You cannot lie on your right side in bed as this increases your pain
- You have used heat and over the counter pain relievers, and have been avoiding using your right shoulder to reach for objects or carry heavy shopping



You visit a healthcare provider (e.g. general practitioner or physiotherapist)

Your health care provider asks you questions about your shoulder pain, and some health questions to rule out any worrying causes

Your health care provider does a detailed physical examination. It involves:

- Looking at your shoulder
- Checking if you can move your shoulder in certain directions, and whether this causes pain
- Checking if they can move your shoulder in certain directions, and whether this causes pain
- Checking if movement of your shoulder against resistance causes pain

AFTER THIS, YOUR HEALTH CARE PROVIDER TELLS YOU:

"You have [label]"

"I am not worried that there is anything serious going on here because your pain is not related to severe trauma. I am also not worried that you have arthritis in your shoulder or a specific condition called frozen shoulder that causes severe pain and stiffness. Your pain should gradually improve over time by itself. It is recommended that you temporarily avoid activities that aggravate your pain and continue to use your arm so your shoulder does not stiffen up."

148

149

Outcome data were collected immediately after participants were randomised to a label. In this paper, we focus on free-text responses to two questions:

1. *When you hear the term [one of the six labels], what words or feelings does this make you think of? Please list.*
2. *What treatment (s) (if any) do you think a person with a [one of the six labels] needs? Please list.*

2.4. Data analysis

Free-text responses to the above questions were analysed using content analysis. Content analysis combines quantitative and qualitative research methods and is a well-accepted approach for analysing text data [24]. Content analysis allowed us to report the frequency of themes expressed in responses. Two researchers (JZ and ZAM) initially read through the responses to become familiar with their content. To develop the coding framework, an inductive approach was used. The two researchers independently coded 50 responses from each labelling group for both questions (~24% of all responses). The frameworks were then compared, discussed and harmonised into the one framework for the next stage of coding. The analysis represents the perspectives of physiotherapists currently working in research and with extensive experience managing patients with musculoskeletal pain.

Once the framework had been developed, the two researchers independently applied the framework to a random sample of responses, ensuring at least 20% of responses from each labelling group were coded. Each response was allocated as many codes as appropriate; nine was the highest number of codes given to a single response. Kappa statistics (k) and 95% confidence intervals (CI) and exact agreement (%) were calculated to assess the level of agreement between JZ and ZAM for coding responses to both questions. k were interpreted as: <0.00='poor', 0.00 to 0.20='slight', 0.21 to 0.40='fair', 0.41 to 0.60='moderate', 0.61 to 0.80='substantial' and ≥0.81='almost perfect' [25]. Analyses investigating level of agreement

were performed using Stata (V.16.1) and 5,000 bootstrap replications were used to calculate 95% CI. Reliability of the coding framework was deemed acceptable if level of agreement between the two researchers coding a random sample of responses was k≥0.8. Once agreement was acceptable, the two researchers (JZ and ZM) applied the framework to the remaining responses. A detailed outline of the final coding framework is presented in Supplementary Table 1.

2.5. Patient or Public Involvement

Patients and members of the public were not involved in the design of this study.

3. Results

3.1. Sample characteristics and level of agreement

In our online trial, 1,626 eligible participants were randomised to the six labelling arms (Figure 1). 318 participants (19.6%) did not respond to the free-text response questions, leaving 1,308 (80.4%) responses to each question for inclusion in the analysis (2,618 total responses). Level of agreement between the two researchers coding a random sample of responses was 'almost perfect' for question 1 (range across the six labelling groups: k=0.90 to 0.97) and question 2 (k=0.91 to 0.97) (Supplementary Table 2).

Characteristics of the sample are reported in Table 1. In summary, there were 437 (33.4%) participants with no history of shoulder pain, 434 (33.2%) currently experiencing shoulder pain, and 437 (33.4%) with a history of shoulder pain but currently pain free. Participants mean age (SD) was 40.3 (16.0) years and 59.1% were females. For participants with previous or current shoulder pain, 65.6% had received treatment for their shoulder pain and 27.7% had been given a specific diagnosis, 44.4% had received imaging, 21.2% an injection and 8.7% surgery for their shoulder pain. Characteristics were largely similar between the six labelling groups.

3.2. When you hear the term [one of the six labels], what words or feelings does this make you think of?

Our framework included 15 themes (Table 2). Supplementary Table 3 provides examples of participants' free-text responses for this question. Pain experience was the most common theme across all labelling groups (30.8-59.4% of responses). Activity restriction was most often expressed by participants labelled with a *shoulder sprain* (25.8%), *rotator-cuff-related shoulder pain* (21.1%) and *episode of shoulder pain* (18.3%). Tissue damage or dysfunction was most often expressed by participants labelled with *bursitis* (36.0%), *rotator cuff tear* (21.9%) and *shoulder spain* (20.7%).

Uncertainty was most often expressed by participants labelled with *subacromial impingement syndrome* (22.0%) and *bursitis* (13.3%), and least often expressed by those labelled with a *rotator cuff tear* (4.8%) and *shoulder sprain* (0.9%). Psychological distress (20.6%) and serious issue (15.4%) were most often expressed by participants labelled with *subacromial impingement syndrome*; serious issue was least often expressed by those labelled with *bursitis* (2.7%), *rotator-cuff-related shoulder pain* (4.1%), *shoulder sprain* (2.3%), and *episode of shoulder pain* (0.9%) (Table 2).

Good prognosis was most often expressed by participants labelled with an *episode of shoulder pain* (17.4%) and *shoulder sprain* (16.6%), and least often expressed by those labelled with *subacromial impingement syndrome* (4.7%) and *rotator-cuff-related shoulder pain* (4.1%). Poor prognosis was most often expressed by participants labelled with *subacromial impingement syndrome* (9.3%) and *rotator cuff tear* (8.1%), and least often expressed by those labelled with *bursitis* (2.7%) and *episode of shoulder pain* (3.1%). Treatment/investigation was most often expressed by participants labelled with a *rotator cuff tear* (11.0%) and *rotator-cuff-related shoulder pain* (9.6%). Minor issue was most often expressed by participants labelled

with a *shoulder sprain* (12.9%), and least often expressed by those labelled with a *rotator cuff tear* (4.8%) (Table 2).

3.3. What treatment (s) (if any) do you think a person with [one of the six labels] needs?

Our framework included 41 themes. The most common treatment themes expressed across the labels were medication (17.1–37.1% of responses), rest (15.6–28.0%), physiotherapy (13.3–25.0%) and exercise (11.7–19.8%). Surgery was most often expressed by participants labelled with a *rotator cuff tear* (19.0%) and *rotator-cuff-related shoulder pain* (18.3%), and least often expressed by those labelled with *bursitis* (4.9%) and *episode of shoulder pain* (5.8%). Injection was most often expressed by participants labelled with *subacromial impingement syndrome* (11.7%), *bursitis* (9.8%) and *episode of shoulder pain* (9.4%), and least often expressed by those labelled with a *rotator cuff tear* (5.7%). Investigation was most often expressed by participants labelled with an *episode of shoulder pain* (8.9%) and *rotator-cuff-related shoulder pain* (7.3%), and was expressed by 3.1-4.6% of participants across the other labels (Tables 3 & 4; Supplementary Table 4).

4. Discussion

4.1. Summary of key findings

There were a variety of themes elicited from the two questions regarding words or feelings evoked by the diagnostic label and treatments perceived as necessary for rotator cuff disease. The findings could explain why, in the quantitative part of our trial [14], participants labelled with *subacromial impingement syndrome* had higher perceived need for imaging when compared to those labelled with *bursitis,* and those labelled with a *rotator cuff tear* had higher perceived need for surgery and imaging when compared to those labelled with *bursitis*. Feelings of psychological distress (20.6%), uncertainty (22.0%), and that the condition is serious (15.4%) and has a poor prognosis (9.3%) were commonly expressed by those labelled

with *subacromial impingement syndrome*. For those labelled with a *rotator cuff tear,* feelings of psychological distress (12.9%), and that the condition is serious (9.0%) and has a poor prognosis (8.1%) were relatively common, while few perceived it as a minor issue (4.8%). Although feelings of tissue damage or dysfunction were expressed most often by participants labelled with *bursitis* (36.0%), it was uncommon for participants to perceive *bursitis* as a serious condition (2.7%), a condition with a poor prognosis (2.7%) or a condition associated with psychological distress (8.4%). These themes might explain why the need for treatment/investigation and surgery were more common among those labelled with a *rotator cuff tear* (11.0% and 19.0%, respectively) and *subacromial impingement syndrome* (9.3% and 9.8%) compared to *bursitis* (7.1% and 4.9%).

4.2. Strengths and weaknesses of this study

Key strengths of this study include use of a large sample size, a highly reliable coding framework (k=0.90 to 0.97 across labelling groups for both questions) and including people with and without shoulder pain. Including people with and without the target health condition is important when trying to explore the perceptions of both patients and the general public, yet it is uncommon in labelling studies [13, 26-29]. Another strength is that the online experiment which provided data for this study used high-quality methods (e.g. randomisation, allocation concealment).

The main weakness of this study is that it was an online experiment; hence, people's feelings towards different labels and what treatments they feel are needed might be different in a clinical encounter. Other labels not investigated in this study (e.g. rotator cuff disease, painful arc syndrome) may have provoked different words or feelings and perceived treatment needs. Outcomes were only assessed immediately after participants were given the label. Our findings may have been different if we gave participants more time to reflect on their label. Since the

health professional in the vignette was not concerned about any label, participants may have had fewer negative feelings towards the labels and felt extensive treatment was unnecessary. Very low health literacy may have also limited understanding of the message from the health professional in the vignette. The need for investigation may have been low in response to the second question (3.1-8.9%) because the question only referred to what 'treatments' a person needs. Finally, this study only focused on the feelings and needs of patients and the public, whereas clinician-related factors (e.g. beliefs, bias) might be a stronger driver of management choices in the real world.

4.3. Meaning of the study

The qualitative findings from our online randomised controlled experiment (i.e. the current content analysis) corroborate with the quantitative findings [14] and highlights the potential value of avoiding certain labels for rotator cuff disease. Our online experiment found participants labelled with a *rotator cuff tear* had higher perceived need for surgery and imaging when compared to those labelled with *bursitis*, while those labelled with *subacromial impingement syndrome* had higher perceived need for imaging when compared to those labelled with *bursitis*. In this content analysis, participants labelled with *subacromial impingement syndrome* and *rotator cuff tear* were more likely to associate these labels with psychological distress, a serious condition, poor prognosis and the need for treatment/investigation and surgery, compared to those labelled with *bursitis*.

Encouraging clinicians to avoid labels that increase patients' perceived need for unnecessary care, such as shoulder surgery and diagnostic imaging, could improve the management of patients with rotator cuff disease. However, since there is no data on the acceptability of avoiding certain labels among patients and health professionals, educating clinicians on the importance of addressing misconceptions among patients with rotator cuff disease may be a

more acceptable starting point. For example, patients labelled with *subacromial impingement syndrome* may need reassurance that they do not have a serious condition and education to reduce any psychological distress or uncertainty. Similarly, patients labelled with a *rotator cuff tear* may need reassurance that tears rarely need to be repaired because they are common in asymptomatic people and symptoms associated with tears often improve without surgery.

4.4. Comparison to existing literature

Although this is the first study to examine public and patient perceptions of different labels for rotator cuff disease, the findings align with qualitative work which suggests patients given a structural diagnosis (e.g. subacromial impingement syndrome, where pain is caused by a bone spur that is reducing the subacromial space) believe surgery will fix their problem [30]. We found perceived need for treatment/investigation was most common among those labelled with a *rotator cuff tear* (11.0%) and *subacromial impingement syndrome* (9.3%). Further, surgery was most often expressed by those labelled with a *rotator cuff tear* (19.0%).

The findings of this study also align with a content analysis conducted by our group exploring public and patient perceptions of different labels for low back pain (O'Keeffe M, et al. Public and patient perceptions of diagnostic labels for low back pain: a content analysis. Under review). The study analysed free-text responses to two questions (identical to the questions asked in this study) which were collected in a six-arm, online randomised controlled experiment in participants with and without low back pain. Feelings of a poor prognosis was most common among participants labelled with a *disc bulge*, *degeneration* and *arthritis*, while feelings of a good prognosis was most common among those labelled with *lumbar sprain*, *non-specific low back pain* and an *episode of low back pain*. This is similar to our study where 'poor prognosis' was often expressed by participants given structural labels for rotator cuff disease (e.g. *subacromial impingement syndrome*) and 'good prognosis' was often expressed by those

given non-specific labels (e.g. *episode of shoulder pain, shoulder sprain*). *Bursitis* was the exception to this trend; a structural diagnosis that was rarely associated with 'poor prognosis' (2.7%).

Perceived treatment needs for low back pain and rotator cuff disease appear to be similar. The top four treatments in the low back pain content analysis were exercise (41%), medication (31%), rest (24%) and physiotherapy (18%) (O'Keeffe M, et al. Public and patient perceptions of diagnostic labels for low back pain: a content analysis. Under review). In this study, the top four treatments for rotator cuff disease were medication (28%), rest (23%), physiotherapy (22%) and exercise (15%). One difference is that exercise appears to be a more acceptable treatment for low back pain. For both low back pain and rotator cuff disease, labels appear to influence participants' perceived need for surgery. For low back pain, surgery was perceived as necessary among participants labelled with *disc bulge*, *degeneration* and *arthritis* more often than it was among those labelled with *lumbar sprain*, *non-specific low back pain*, and an *episode of low back pain*. For rotator cuff disease, surgery was perceived as necessary among participants labelled with a *rotator cuff tear*, *rotator-cuff-related shoulder pain*, and (to a lesser extent) *subacromial pain syndrome* more often than it was among those labelled with *bursitis*, *shoulder sprain* and *episode of shoulder pain*.

4.5. Unanswered questions and future research

Although some labels provoked negative feelings and perceived need for unnecessary care more than others, we do not know whether health professionals would find avoiding certain labels acceptable. Qualitative research is needed to fill this important knowledge gap. Our quantitative analysis also found only small differences in patients' perceived need for surgery and imaging between certain labels; these differences may not be clinically meaningful. Providing context and explanation for imaging findings (i.e. that they are common in people

without pain and in older people) and addressing misconceptions that are associated with certain labels might be more important for patients than avoiding certain labels. Testing these approaches should be a research priority.

5. Conclusion

Words or feelings evoked by certain labels for rotator cuff disease and perceived treatment needs may explain why some labels drive management preferences towards surgery and imaging more than others. Feelings of psychological distress, uncertainty, and that the condition is serious and has a poor prognosis were most common among those labelled with *subacromial impingement syndrome*. For those labelled with a *rotator cuff tear,* feelings of psychological distress, and that the condition is serious and has a poor prognosis were relatively common, while few perceived it as a minor issue. Although feelings of tissue damage or dysfunction were expressed most often by participants labelled with *bursitis*, it was uncommon for participants to perceive *bursitis* as a serious condition, a condition with a poor prognosis or a condition associated with psychological distress. The need for treatment/investigation and surgery were also more common among those labelled with a *rotator cuff tear* and *subacromial impingement syndrome* compared to *bursitis*. Interventions addressing misconceptions and perceived need for unnecessary care in patients given different labels for rotator cuff disease, and the clinicians who provide these labels, should be tested.

Authors' contributions

All authors critically revised the manuscript for important intellectual content and approved the final manuscript. Please find below a detailed description of the role of each author:

- Joshua R Zadro: conception and design, analysis and interpretation of data, drafting and revision of the manuscript, and final approval of the version to be published
- Zoe A Michaleff: conception and design, analysis and interpretation of data, drafting and revision of the manuscript, and final approval of the version to be published
- Mary O'Keeffe: conception and design, interpretation of data, drafting and revision of the manuscript and final approval of the version to be published
- Giovanni Ferreira: conception and design, interpretation of data, drafting and revision of the manuscript and final approval of the version to be published
- Romi Haas: conception and design, interpretation of data, drafting and revision of the manuscript and final approval of the version to be published
- Ian A Harris: conception and design, interpretation of data, drafting and revision of the manuscript and final approval of the version to be published
- Rachelle Buchbinder: conception and design, interpretation of data, drafting and revision of the manuscript and final approval of the version to be published
- Christopher G Maher: conception and design, interpretation of data, drafting and revision of the manuscript and final approval of the version to be published

The Corresponding Author (JZ) attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Data availability statement: Data is available on reasonable request.

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479 Table 1. Characteristics of participants

ALL PARTICIPANTS	Total sample (n=1,308)	Subacromial impingement syndrome (n=214)	Rotator cuff tear (n=210)	Bursitis (n=225)	Rotator-cuff-related shoulder pain (n=218)	Shoulder sprain (n=217)	Episode of shoulder pain (n=224)
Type of participant n (%)							
No history of shoulder pain	437 (33.4%)	74 (34.6%)	70 (33.3%)	67 (29.8%)	76 (34.9%)	74 (34.1%)	76 (33.9%)
Current shoulder pain	434 (33.2%)	67 (31.3%)	69 (32.9%)	72 (32.0%)	79 (36.2%)	68 (31.3%)	79 (35.3%)
History of shoulder pain (currently pain free)	437 (33.4%)	73 (34.1%)	71 (33.8%)	86 (3.2%)	63 (28.9%)	75 (34.6%)	69 (30.8%)
Age (years), mean (SD)	40.3 (16.0)	39.9 (15.6)	41.0 (16.4)	40.9 (15.0)	41.0 (17.3)	39.4 (16.5)	39.4 (15.4)
Female, n (%)	773 (59.1%)	132 (61.7%)	109 (51.9%)	132 (58.7%)	127 (58.3%)	131 (60.4%)	142 (63.4%)
Country, n (%)							
Australia	270 (20.6%)	42 (19.6%)	50 (23.8%)	39 (17.3%)	49 (22.5%)	47 (21.7%)	43 (19.2%)
New Zealand	224 (17.1%)	37 (17.3%)	30 (14.3%)	40 (17.8%)	35 (16.1%)	40 (18.4%)	42 (18.8%)
United States	273 (20.9%)	48 (22.4%)	39 (18.6%)	53 (23.6%)	47 (21.6%)	42 (19.4%)	44 (19.6%)
United Kingdom	270 (20.6%)	34 (15.9%)	43 (20.5%)	54 (24.0%)	46 (21.1%)	39 (18.0%)	54 (24.1%)
Canada	271 (20.7%)	53 (24.8%)	48 (22.9%)	39 (17.3%)	41 (18.8%)	49 (22.6%)	41 (18.3%)
Education, n (%)							
High school (not completed)	98 (7.5%)	10 (4.7%)	21 (10.0%)	13 (5.8%)	16 (7.3%)	20 (9.2%)	18 (8.0%)
High school (completed)	438 (33.5%)	78 (36.5%)	71 (33.8%)	55 (24.4%)	88 (40.4%)	70 (32.3%)	76 (33.9%)
Non-university tertiary education	175 (13.4%)	24 (11.2%)	22 (10.5%)	37 (16.4%)	32 (14.7%)	28 (12.9%)	32 (14.3%)
University	597 (45.6%)	102 (47.7%)	96 (45.7%)	120 (53.3%)	82 (37.6%)	99 (45.6%)	98 (43.8%)
Employment, n (%)							
Employed	792 (60.6%)	134 (62.6%)	132 (62.9%)	142 (63.1%)	138 (63.3%)	125 (57.6%)	121 (54.0%)
Unemployed	303 (23.2%)	53 (24.8%)	46 (21.9%)	51 (22.7%)	39 (17.9%)	54 (24.9%)	60 (26.8%)
Student	62 (4.7%)	6 (2.8%)	9 (4.3%)	9 (4.0%)	9 (4.1%)	11 (5.1%)	18 (8.0%)
Retired	151 (11.5%)	21 (9.8%)	23 (11.0%)	23 (10.2%)	32 (14.7%)	27 (12.4%)	25 (11.2%)
Private health insurance, n (%)	563 (43.0%)	106 (49.5%)	94 (44.8%)	90 (40.0%)	91 (41.7%)	91 (41.9%)	91 (40.6%)
General health, n (%)							
Very good	248 (19.0%)	43 (20.1%)	42 (20.0%)	48 (21.3%)	38 (17.4%)	35 (16.1%)	42 (18.8%)

Good	724 (55.4%)	124 (57.9%)	110 (52.4%)	124 (55.1%)	129 (59.2%)	128 (59.0%)	109 (48.7%)
Neither good nor poor	234 (17.9%)	33 (15.4%)	44 (21.0%)	39 (17.3%)	33 (15.1%)	40 (18.4%)	45 (20.1%)
Poor	89 (6.8%)	14 (6.5%)	13 (6.2%)	13 (5.8%)	15 (6.9%)	9 (4.2%)	25 (11.2%)
Very poor	13 (1.0%)	0 (0%)	1 (0.5%)	1 (0.4%)	3 (1.4%)	5 (2.3%)	3 (1.3%)
Anxiety (0-10, higher scores indicate greater anxiety), mean (SD)	5.1 (3.0)	5.3 (3.1)	5.1 (3.0)	5.0 (3.1)	4.9 (3.0)	4.9 (3.1)	5.2 (2.9)
Depression (0-10, higher scores indicate greater depression), mean (SD)	4.2 (3.1)	4.6 (3.2)	4.2 (3.2)	4.0 (3.1)	4.0 (3.0)	4.0 (3.1)	4.2 (3.1)
PARTICIPANTS WITH PREVIOUS OR CURRENT SHOULDER PAIN	**Total sample (n=871)**	**Subacromial impingement syndrome (n=140)**	**Rotator cuff tear (n=140)**	**Bursitis (n=158)**	**Rotator-cuff-related shoulder pain (n=142)**	**Shoulder sprain (n=143)**	**Episode of shoulder pain (n=148)**
Previous shoulder pain treatment, n (%)	571 (65.6%)	97 (69.3%)	87 (62.1%)	99 (62.7%)	99 (69.7%)	90 (63.0%)	99 (66.9%)
Previous shoulder surgery, n (%)	76 (8.7%)	12 (8.6%)	5 (3.6%)	13 (8.2%)	20 (14.1%)	13 (9.1%)	13 (8.8%)
Previous shoulder imaging, n (%)	387 (44.4%)	65 (46.4%)	56 (40.0%)	70 (44.3%)	74 (52.1%)	63 (44.1%)	59 (39.9%)
Previous shoulder injection, n (%)	185 (21.2%)	37 (26.4%)	24 (17.1%)	33 (20.9%)	34 (23.9%)	27 (18.9%)	30 (20.3%)
Previous sick leave for shoulder pain, n (%)	344 (39.5%)	58 (41.4%)	44 (31.4%)	62 (39.2%)	62 (43.7%)	55 (38.5%)	63 (42.6%)
Previous shoulder pain diagnosis, n (%)	241 (27.7%)	45 (32.1%)	31 (22.1%)	41 (26.0%)	42 (29.6%)	42 (29.4%)	40 (27.0%)
PARTICIPANTS WITH CURRENT SHOULDER PAIN	**Total sample (n=434)**	**Subacromial impingement syndrome (n=67)**	**Rotator cuff tear (n=69)**	**Bursitis (n=72)**	**Rotator-cuff-related shoulder pain (n=79)**	**Shoulder sprain (n=68)**	**Episode of shoulder pain (n=79)**
Duration of current shoulder pain, n (%)							
Less than 1 week	61 (14.1%)	9 (13.4%)	13 (18.8%)	8 (11.1%)	11 (13.9%)	11 (16.2%)	9 (11.4%)
1 week to 3 months	161 (37.1%)	27 (40.3%)	26 (37.8%)	21 (29.2%)	32 (40.5%)	24 (35.3%)	31 (39.2%)
4 months to 12 months	62 (14.3%)	10 (14.9%)	4 (5.8%)	19 (26.4%)	13 (16.5%)	8 (11.8%)	8 (10.1%)
Longer than 12 months	150 (34.6%)	21 (31.3%)	26 (37.7%)	24 (33.3%)	23 (29.1%)	25 (36.8%)	31 (39.2%)
Total SPADI (0-100), mean (SD)	53.1 (21.0)	58.8 (20.7)	52.1 (22.0)	54.3 (21.7)	51.6 (19.1)	52.5 (20.0)	49.9 (22.2)
Pain subscore (0-100)	58.5 (19.9)	63.7 (19.4)	56.3 (21.8)	60.1 (18.9)	57.2 (17.7)	58.7 (19.7)	55.7 (21.1)

Disability subscore (0-100)	47.7 (24.4)	53.9 (23.4)	47.8 (24.6)	48.5 (26.8)	46.0 (22.7)	46.4 (23.2)	44.1 (25.2)

n: number of participants; SD: standard deviation; SPADI: Shoulder Pain and Disabilty Index.

Table 2. Themes for words or feelings across all labels

Theme	Total sample (n=1,308)	Subacromial impingement syndrome (n=214)	Rotator cuff tear (n=210)	Bursitis (n=225)	Rotator-cuff-related shoulder pain (n=218)	Shoulder sprain (n=217)	Episode of shoulder pain (n=224)
1	Pain experience (n=637, 48.7%)	Pain experience (n=66, 30.8%)	Pain experience (n=105, 50.0%)	Pain experience (n=106, 47.1%)	Pain experience (n=106, 48.6%)	Pain experience (n=129, 59.4%)	Pain experience (n=125, 55.8%)
2	Tissue damage or dysfunction (n=278, 21.3%)	Uncertainty (n=47, 22.0%)	Tissue damage or dysfunction (n=46, 21.9%)	Tissue damage or dysfunction (n=81, 36.0%)	Activity restriction (n=46, 21.1%)	Activity restriction (n=56, 25.8%)	Activity restriction (n=41, 18.3%)
3	Activity restriction (n=207, 15.8%)	Psychological distress (n=44, 20.6%)	Activity restriction (n=29, 13.8%)	Uncertainty (n=30, 13.3%)	Tissue damage or dysfunction (n=36, 16.5%)	Tissue damage or dysfunction (n=45, 20.7%)	Good prognosis (n=39, 17.4%)
4	Psychological distress (n=157, 12.0%)	Tissue damage or dysfunction (n=43, 20.1%)	Psychological distress (n=27, 12.9%)	Activity restriction (n=20, 8.9%)	Psychological distress (n=30, 13.8%)	Good prognosis (n=36, 16.6%)	Tissue damage or dysfunction (n=27, 12.1%)
5	Good prognosis (n=123, 9.4%)	Serious issue (n=33, 15.4%)	Treatment/investigation (n=23, 11.0%)	Psychological distress (n=19, 8.4%)	Treatment/investigation (n=21, 9.6%)	Minor issue (n=28, 12.9%)	Psychological distress (n=25, 11.2%)
6	Uncertainty (n=114, 8.7%)	Minor issue (n=21, 9.8%)	Unhappy/frustration (n=21, 10.0%)	Irrelevant response (n=17, 7.6%)	Minor issue (n=19, 8.7%)	Mechanism of injury (n=21, 9.7%)	Minor issue (n=22, 9.8%)
7	Minor issue (n=113, 8.6%)	Treatment/investigation (n=20, 9.3%)	Serious issue (n=19, 9.0%)	Treatment/investigation (n=16, 7.1%)	Uncertainty (n=17, 7.8%)	Unhappy/frustration (n=20, 9.2%)	Treatment/investigation (n=17, 7.6%)
8	Treatment/investigation (n=112, 8.6%)	Poor prognosis (n=20, 9.3%)	Poor prognosis (n=17, 8.1%)	Good prognosis (n=14, 6.2%)	Mechanism of injury (n=14, 6.4%)	Treatment/investigation (n=15, 6.9%)	Unhappy/frustration (n=17, 7.6%)

9	Unhappy/frustration (n=84, 6.4%)	Activity restriction (n=15, 7.0%)	Good prognosis (n=15, 7.1%)	Minor issue (n=13, 5.8%)	Poor prognosis (n=12, 5.5%)	Psychological distress (n=12, 5.5%)	Mechanism of injury (n=13, 5.8%)
10	Serious issue (n=74, 5.7%)	Unhappy/frustration (n=11, 5.1%)	Mechanism of injury (n=12, 5.7%)	Unhappy/frustration (n=8, 3.6%)	Irrelevant response (n=10, 4.6%)	Poor prognosis (n=8, 3.7%)	Uncertainty (n=8, 3.6%)
11	Mechanism of injury (n=72, 5.5%)	Good prognosis (n=10, 4.7%)	Uncertainty (n=10, 4.8%)	Mechanism of injury (n=7, 3.1%)	Good prognosis (n=9, 4.1%)	Serious issue (n=5, 2.3%)	Feels dismissed (n=8, 3.6%)
12	Poor prognosis (n=70, 5.4%)	Mechanism of injury (n=5, 2.3%)	Minor issue (n=10, 4.8%)	Serious issue (n=6, 2.7%)	Serious issue (n=9, 4.1%)	Irrelevant response (n=3, 1.4%)	Poor prognosis (n=7, 3.1%)
13	Irrelevant response (n=47, 3.6%)	Irrelevant response (n=4, 1.9%)	Irrelevant response (n=6, 2.9%)	Poor prognosis (n=6, 2.7%)	Unhappy/frustration (n=7, 3.2%)	Uncertainty (n=2, 0.9%)	Irrelevant response (n=7, 3.1%)
14	Feels dismissed (n=12, 0.9%)	Feels dismissed (n=2, 0.9%)	Aging (n=1, 0.5%)	Aging (n=5, 2.2%)	Aging (n=1, 0.5%)	Feels dismissed (n=2, 0.9%)	Serious issue (n=2, 0.9%)
15	Aging (n=9, 0.7%)	Aging (n=1, 0.5%)	Feels dismissed (n=0, 0%)	Feels dismissed (n=0, 0%)	Feels dismissed (n=0, 0%)	Aging (n=1, 0.5%)	Aging (n=0, 0%)

0 – 4.9%	**5 – 9.9%**	**10 – 14.9%**	**15 – 24.9%**	**25% +**

Table 3. Top 10 treatment themes for each label

Theme	Subacromial impingement syndrome (n=214)	Rotator cuff tear (n=210)	Bursitis (n=225)	Rotator-cuff-related shoulder pain (n=218)	Shoulder sprain (n=217)	Episode of shoulder pain (n=224)
1	Rest (n=59, 27.6%)	Physiotherapy (n=49, 23.3%)	Medication (n=69, 30.7%)	Medication (n=61, 28.0%)	Medication (n=71, 32.7%)	Medication (n=83, 37.1%)
2	Physiotherapy (n=51, 23.8%)	Rest (n=47, 22.4%)	Rest (n=63, 28.0%)	Physiotherapy (n=52, 23.9%)	Rest (n=55, 25.3%)	Physiotherapy (n=56, 25.0%)
3	Medication (n=48, 22.4%)	Surgery (n=40, 19.0%)	Activity modification (n=31, 13.8%)	Surgery (n=40, 18.3%)	Physiotherapy (n=43, 19.8%)	Rest (n=42, 18.8%)
4	Activity modification (n=38, 17.8%)	Medication (n=36, 17.1%)	Exercise (n=31, 13.8%)	Exercise (n=34, 15.6%)	Exercise (n=43, 19.8%)	Exercise (n=34, 15.2%)
5	Injection (n=25, 11.7%)	Activity modification (n=30, 14.3%)	Physiotherapy (n=30, 13.3%)	Rest (n=34, 15.6%)	Heat (n=33, 15.2%)	Heat (n=24, 10.7%)
6	Exercise (n=25, 11.7%)	Exercise (n=26, 12.4%)	Injection (n=22, 9.8%)	Exercise (intensity not specified) (n=25, 11.5%)	Exercise (intensity not specified) (n=32, 14.7%)	Massage (n=22, 9.8%)
7	Surgery (n=21, 9.8%)	Heat (n=16, 7.6%)	Heat (n=20, 8.9%)	Activity modification (n=19, 8.7%)	Cold (n=25, 11.5%)	Injection (n=21, 9.4%)
8	Exercise (intensity not specified) (n=19, 8.9%)	Unsure (n=16, 7.6%)	Cold (n=18, 8.0%)	Injection (n=16, 7.3%)	Activity modification (n=20, 9.2%)	Investigations (n=20, 8.9%)
9	Unsure (n=17, 7.9%)	Exercise (intensity not specified)	Exercise (intensity not specified)	Investigations (n=16, 7.3%)	Massage (n=17, 7.8%)	Exercise (intensity not specified)

		(n=15, 7.1%)	(n=16, 7.1%)			(n=19, 8.5%)
10	Heat (n=14, 6.5%)	Wait and see (n=13, 6.2%)	Normal movements (n=16, 7.1%)	Irrelevant response (n=12, 5.5%)	Surgery (n=16, 7.4%)	Activity modification (n=18, 8.0%)

Table 4. All treatment themes from participants (n=1,308)

Treatment label	N (%)
Medication	368 (28.1%)
Rest	300 (22.9%)
Physiotherapy	281 (21.5%)
Exercise	193 (14.8%)
• Exercise (intensity not specified)	126 (9.6%)
• Light exercise	67 (5.1%)
Activity modification	156 (11.9%)
Surgery	141 (10.8%)
Heat	117 (8.9%)
Injection	110 (8.4%)
Cold	86 (6.6%)
Massage	83 (6.3%)
Unsure	74 (5.7%)
Investigations	69 (5.3%)
Doctor	61 (4.7%)
Topical treatments	55 (4.2%)
Normal movements	54 (4.1%)
No treatment	48 (3.7%)
Wait and see	37 (2.8%)
Irrelevant response	35 (2.7%)
Chiropractor	29 (2.2%)
Acupuncture	22 (1.7%)
Immobilisation	16 (1.2%)
Specialist	15 (1.1%)
Taping/bracing	14 (1.1%)
Hydrotherapy	9 (0.7%)
Natural or unknown therapies	9 (0.7%)
Compression	7 (0.5%)
Time off work	7 (0.5%)
Diet	6 (0.5%)
Electrotherapy	5 (0.4%)
Manipulation	5 (0.4%)
Prayer/hope/meditation	5 (0.4%)
Second opinion	4 (0.3%)
Elevation	3 (0.2%)
Ergonomics/posture	3 (0.2%)
Osteopathy	3 (0.2%)
Stay healthy	3 (0.2%)
Emergency department/hospital	2 (0.2%)
Cognitive behavioural therapy	1 (0.1%)
Good mattress	1 (0.1%)
Pain clinic	1 (0.1%)

N/A: not applicable; N: number of participants.

Figure legend

Figure 1. Flow diagram

Supplementary Tables

Supplementary Table 1. Coding Framework

Supplementary Table 2. Number of responses, codes, percent exact agreement and Kappa (95% Confidence Interval) for the level of agreement between reviews for coding a random sample of responses

N: number of responses coded; k: kappa coefficient; CI: confidence interval.

Supplementary Table 3. Examples of participants' open-ended responses regarding 'words or feelings' (question 1) across labels (top 10 codes only)

P: participant.

Supplementary Table 4. All treatment themes across labels

N: number of participants.

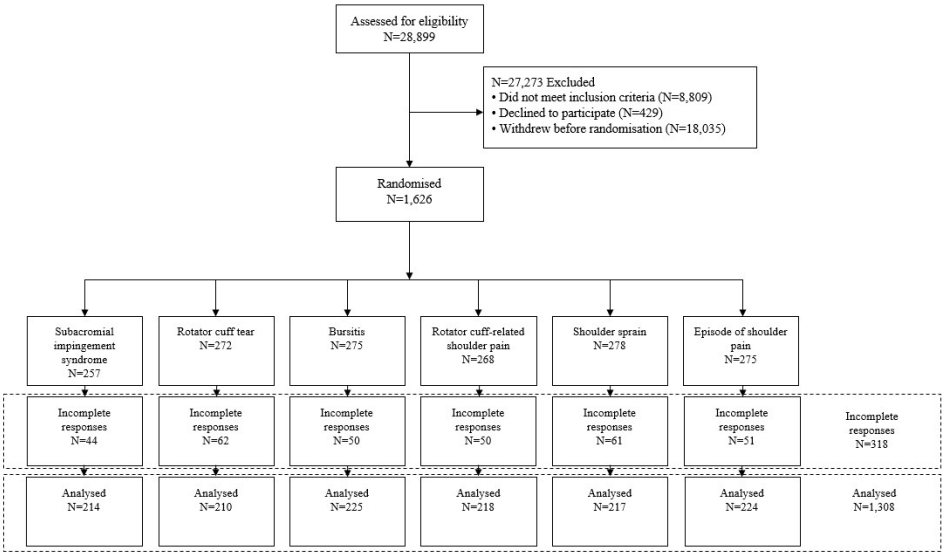

Figure 1. Flow diagram

303x174mm (96 x 96 DPI)

Supplementary Table 1. Coding framework

Questions 1: When you hear the term [one of the six labels], what words or feelings does this make you think of?

Code	Explanation	Examples
Activity restriction	Any reference to being unable to do typical daily activities	Caution, light work, rest, sleep loss, time off work, careful
Aging	Any reference to the condition being due to aging	Old, getting old/older, ancient
Psychological distress	Any reference to feelings of fear, anxiety, worry or stress	Fear, anxious, worry, stress, scared, depressed, nervous, etc.
Feels dismissed	Any reference to feeling dismissed by another person	Not interested in my opinion, not bad to those who don't suffer from it, not real, made up
Good prognosis	Any reference to the condition recovering either quickly or without treatment	Temporary, no treatment needed, heal over time
Irrelevant response	The response did not address the question	"Nothing at all", "I don't really have any feelings"
Mechanism of injury	Any reference to why the pain started	Injury, overuse issue, caused by lifting, sports injury
Minor issue	Any reference to the condition being 'non-serious'	Not serious, everyday issue, common, annoyance, uncomfortable, inconvenient
Pain experience	Any reference to pain	Pain, hurt, intermittent, discomfort, recurrent
Poor prognosis	Any reference to the condition taking a long time to recover	Persistent pain, long recovery, long-term issue
Serious issue	Any reference to the condition being 'serious'	Deteriorating, serious, bad, very ill
Tissue damage or dysfunction	Any reference to tissue damage or dysfunction	Tendon tear, arm out of place, sprained ligaments, pulled muscle, stiffness, weakness
Treatment/ investigation	Any reference to the need for treatment or investigation	Rest, pain medication, heat, surgery, physiotherapy, requires imaging
Uncertainty	Any reference to being unsure what the label means	Complicated, confused, uncertainty, need more information
Unhappy/ frustration	Any reference to being unhappy or frustrated	Sad, anger, annoyed, feel bad, upset, helpless, useless

Question 2: What treatment (s) (if any) do you think a person with [one of the six labels] needs?

Code	**Examples (if needed)**
Activity modification	Avoid lifting, avoid aggravating activities, avoid strenuous activities
Acupuncture	
Chiropractor	
Cognitive behavioural therapy	
Cold	
Compression	
Diet	
Doctor	
Electrotherapy	Laser, ultrasound
Elevation	
Emergency department/hospital	
Ergonomics/posture	Adjust computer screen height
Exercise	
Good mattress	
Heat	
Hydrotherapy	
Immobilisation	Sling
Injection	Cortisone injection
Investigations	X-ray, ultrasound, MRI
Light exercise	Gentle exercise, exercise but be careful
Manipulation	
Massage	
Medication	Panadol, anti-inflammatories, muscle relaxants, supplements
Irrelevant response	
Natural or unknown therapies	Stone therapy, finger therapy, natural remedies, tea, spa baths
No treatment	Time, patience, will heal itself in time
Normal movements	Keep arm moving, normal activity, stay active
Osteopathy	
Pain clinic	
Physiotherapy	
Prayer/hope/meditation	
Rest	Taking it easy, relaxation, reduce overall activity
Second opinion	
Specialist	
Stay healthy	Good sleep, avoid smoking
Surgery	
Taping/bracing	Brace, strapping
Time off work	

Topical treatments	Ointment, rub, Voltaren gel, oils
Unsure	
Wait and see	

Supplementary Table 2. Number of responses, codes, percent exact agreement and Kappa (95% Confidence Interval) for the level of agreement between reviews for coding a random sample of responses

Feelings about label	**N (%)**	**Codes**	**Agreement**	**k**	**95% CI**
All labels	300 (22.9)	562	93.9%	0.93	0.90-0.95
Subacromial impingement syndrome	50 (23.4)	90	94.3%	0.93	0.86-0.98
Rotator cuff tear	50 (23.8)	96	91.6%	0.90	0.82-0.97
Bursitis	50 (22.2)	86	93.3%	0.92	0.84-0.98
Rotator-cuff-related shoulder pain	50 (22.9)	87	97.3%	0.97	0.91-1.00
Shoulder sprain	50 (23.0)	111	93.8%	0.92	0.86-0.98
Episode of shoulder pain	50 (22.3)	92	93.3%	0.92	0.85-0.98
Treatment for label	**N (%)**	**Codes**	**Agreement**	**k**	**95% CI**
All labels	300 (22.9)	586	94.4%	0.94	0.92-0.96
Subacromial impingement syndrome	50 (23.4)	94	93.3%	0.93	0.87-0.98
Rotator cuff tear	50 (23.8)	99	94.7%	0.94	0.88-0.99
Bursitis	50 (22.2)	89	97.8%	0.97	0.94-1.00
Rotator-cuff-related shoulder pain	50 (22.9)	93	95.7%	0.95	0.90-0.99
Shoulder sprain	50 (23.0)	108	93.9%	0.93	0.88-0.98
Episode of shoulder pain	50 (22.3)	103	92.0%	0.91	0.85-0.97

N: number of responses coded; k: kappa coefficient; CI: confidence interval.

Supplementary Table 3. Examples of participants' open-ended responses regarding 'words or feelings' (question 1) across labels (top 10 codes only)

Subacromial impingement syndrome	Rotator cuff tear	Bursitis	Rotator-cuff-related shoulder pain	Shoulder sprain	Episode of shoulder pain
Pain experience					
"Unbearable pain." *[P130, Female, age 40]* "I think that it is pain and very uncomfortable." *[P121, Male, age 45]*	"Very uncomfortable to have." *[P329, Female, age 65]* "Painful, agony." *[P331, Male, age 49]*	"Pain in the shoulder area." *[P520, Male, age 79]* "Pain, swelling, redness." *[P559, Female, age 49]*	"Pain & discomfort." *[P797, Male, age 69]* "Pain that incurs when moved." *[P682, Female, age 38]*	"Tingling, hot sensation, pain on lifting arm up." *[P1044, Female, age 58]* "Pain in shoulder hurting bad." *[P869, Male, age 64]*	"Aching pain throbbing." *[P1120, Male, age 34]* "Very, very sharp pains." *[P1085, Female, age 32]*
Tissue damage or dysfunction					
"Bones trapping tendons/muscles." *[P188, Female, age 28]* "Something pressing in the shoulder. Seizing and/or swelling." *[P208, Male, age 38]*	"Shoulder tear that hurts real bad." *[P236, Female, age 60]* "I have tendon damage." *[P341 , Male, age 48]*	"Fluid sac that is maybe torn or ruptured." *[P577, Female, age 56]* "Inflammation in the shoulder." *[P533, Male, age 45]*	"An injury to muscles." *[P821, Female, age 63]* "Sounds like it is in the area of the shoulder joint. Makes me think there is inflammation or perhaps a pinched nerve."	"A muscle sprain or pinched nerve." *[P922, Male, age 65]* "You didn't break anything you just sprained the ligaments or muscles." *[P1080, Female, age 69]*	"I think if things like a trapped nerve or general injury to the area." *[P1259, Female, age 41]* "Tendon, muscle and all this other pain." *[P1129, Male, age 26]*

			[P837, Male, age 61]		
Activity restriction					
"Pain, being uncomfortable, not being able to do the things you normally do." *[P200, Female, age 63]* "Disability, not being able to work or do activities." *[P106, Male, age 21]*	"I'm useless on one side." *[P243, Male, age 58]* "It's painful and hard to function day to day." *[P267, Female, age 39]*	"Pain and trouble with movement." *[P593, Male, age 42]* "Inflammation, pain, decrease range of motion." *[P569, Female, age 30]*	"Something painful they may limit the ability to move your arm in the way you are accustomed to doing things." *[P792, Female, age 63]* "Annoying restriction to movement." *[P866, Male, age 66]*	"Limited movement." *[P960, Female, age 67]* "Take more care in the things I do." *[P1054, Male, age 60]*	"Affects my everyday actions" *[P1189, Male, age 68]* "Hard to do normal things" *[P1294, Female, age 68]*
Psychological distress					
"Pain, stress, anxious." *[P25, Male, age 64]* "Pinched nerve, sounds scary." *[P145, Female, age 45]*	"Bad feeling, is very not cool." *[P238, Male, age 38]* "The term rotator cuff tear sounds scary." *[P256, Female, age 29]*	"A little scared, because if you don't get it fixed right away, it'll cause stiff shoulder disease." *[P564, Male, age 34]* "It sounds quite scary."	"Scared - what if I lose use of my shoulder?" *[P741, Female, age 37]* "Makes me worried." *[P701, Male, age 38]*	"That I am getting weaker. To sprain my shoulder whilst doing a simple task worries me a little." *[P1050, Female, age 62]* "Scarred, worried, confused." *[P985, Male, age 19]*	"That my body might possibly be deteriorating, perhaps seriously. I would be quite concerned. Anxious, worried." *[P1218, Male, age 47]* "Anxious, teary, worried, troubled"

		[P445, Female, age 46]			*[P1088, Female, age 62]*
Good prognosis					
"Pain which will subside with time. Healing over time if care taken." *[P134, Male, age 69]* "Temporary pain in the shoulder blade." *[P166, Female, age 28]*	"It just needs time to repair itself." *[P407, Female, age 64]* "It sounds threatening, but I am sure this can be recovered during reasonable period of time." *[P395, Male, age 45]*	"Inflammation. Pain eventual recovery." *[P532, Female, age 57]* "Temporary shoulder pain that will just go away." *[P602, Male, age 47]*	"Great now but with the time it cures and no need of doing anything let time show magic." *[P730, Male, age 33]* "Not serious, will heal itself, relax." *[P745, Female, age 65]*	"Strain which eventually will heal itself." *[P1040, Male, age 79]* "Temporary pain from something strenuous I tried to do." *[P1067, Female, age 69]*	"Temporary. Not very serious. Annoying." *[P1271, Female, age 36]* "Short term pain" *[P1273, Male, age 47]*
Uncertainty					
"What the hell is that? Can't they speak in simple terms?" *[P129, Male, age 61]* "Complicated, serious, nervous." *[P114, Female, age 32]*	"I am not sure actually about this except that fact that it is related to shoulder." *[P272, Female, age 34]* "Pain, uncertainty." *[P378, Male, age 68]*	"No idea, something common." *[P565, Male, age 47]* "Do not know what it is." *[P627, Female, age 40]*	"It sounds complicated." *[P858, Female, age 71]* "Not sure what to do at all very sorry but I will go to the therapy." *[P662, Male, age 49]*	"Scarred, worried, confused." *[P985, Male, age 19]* "Honestly it first time I see this world and really I can't guess what it is but it still doesn't mean a serious issue." *[P955, Female, age 41]*	"Episode of shoulder pain is too vague of a term. When I hear it, I want more definitive answers and diagnostic." *[P1144, Male, age 25]* "Does not give a good cause, not a very good name."

					[P1210, Female, age 36]
Minor issue					
“The injury is probably just due to overextending my arm, it is not too serious and should get better.” *[P180, Female, age 38]* “Not sure maybe a slight disorder.” *[P113, Female, age 20]*	“Shoulder pain in the short-term mild discomfort.” *[P405, Male, age 51]* “This is not a serious medical condition. I will recover reasonably soon.” *[P399, Female, age, 41]*	“Words and feelings that come to mind is not to worry.” *[P640, Female, age 24]* “Not as bad as it could have been.” *[P498, Male, age 44]*	“Simple pain, no injury.” *[P775, Male, age 21]* “Painful but not serious.” *[P820, Female, age 36]*	“That it is nothing too serious, just needs rest and gentle exercise.” *[P1073, Male, age 75]* “Temporary, not serious, will improve with time.” *[P1051, Female, age 67]*	“A minor injury with some discomfort *[P1231, Male, age 61]* "Will not stay long. Will cures by itself and no need for medicine” *[P1249, Female, age, 47]*
Treatment/investigation					
"It is pretty serious I may need surgery." *[P129, Male, age 61]* "It sounds like a serious condition and I thought that surgery is require to fix it." *[P51, Female, age 31]*	“Pain, off work, surgery.” *[P420, Male, age 36]* “Shoulder, muscle, surgery, orthopaedics, throwing.” *[P308, Female, age 23]*	“Infection or inflammation that can be treated.” *[P635, Female, age 62]* “A little scared, because if you don't get it fixed right away, it'll cause stiff shoulder disease.” *[P564, Male, age 34]*	“Need to attend very quickly.” *[P774, Male, age 38]* “Long term discomfort, need for exercise regime.” *[P790, Female, age 76]*	“Pain, doctors, sling, X-rays, medication.” *[P910, Female, age 44]* “Damn, now I have to go through physical therapy.” *[P890, Male, age 21]*	“If it persisted for some time, I would visit a doctor and go from there.” *[P1296, Male, age 66]* “It makes me realise that my health professional should point me in the right direction to enable me to help myself.” *[P1209, Female, age 71]*

Unhappy/frustration					
"Fear, anxious, angry, tired." *[P30, Male, age 35]* “Sad, living in pain isn’t fun.” *[P87, Female, age 47]*	“Disgusting pain, unhappy, sad, mad.” *[P300, Male, age 23]* "Causing me to be unhappy when I cannot reach. Causing me to be unhappy when I cannot carry items." *[P351, Female, age 71]*	"Fear, hurt, angry.” *[P446, Male, age 23]* “Pain, stress, anger." *[P452, Female, 42]*	“Frustrated, annoyed, anxious, nervous.” *[P663, Male, age 20]* "Muscular, hurts more when I try and sleep, frustrating, can't do my normal activities." *[P796, Female, age 53]*	“Frustrated, tired.” *[P966, Female, 47]* “Limitations, pain, frustration.” *[P899, Male, age 23]*	“Painful, tiredness, unhappy” *[P1305, Female, age 56]* “Pissed off anxious and angry” *[P1133, Male, age 33]*
Serious issue					
“It sounds scary and serious.” *[P95, Female, age 54]* "Sounds like very serious injury." *[P58, Male, age 39]*	“Serious condition.” *[P301, Female, age 65]* “It sounds very serious.” *[P268, Male, age 25]*	“Serious condition, something has burst, worried.” *[P620, Female, age 33]* “Inflamed area within the body that could harm the human body.” *[P506, Male, age 49]*	“Serious, long term injury.” *[P826, Female, age 38]* “Sounds bad and sounds like it would hurt a lot and might need surgery to fix.” *[P695, Male, age 45]*	“It’s really bad because the stress is here, you think like you got something anywhere else that’s more serious.” *[P875, Male, age 25]* “It could be cancer.” *[P1066, Female, age 46]*	“That my body might possibly be deteriorating, perhaps seriously.” *[P1218, Male, age 47]* “Hurt, shoulder, arm, cancer” *[P1213, Prefer not to say gender, age 26]*

P: participant.

Supplementary Table 4. All treatment themes across labels

Subacromial impingement syndrome (n=214)		Rotator cuff tear (n=210)		Bursitis (n=225)		Rotator-cuff-related shoulder pain (n=218)		Shoulder sprain (n=217)		Episode of shoulder pain (n=224)	
Theme	**N (%)**	**Theme**	**N (%)**	**Theme**	**N (%)**	**Theme**	**N (%)**	**Theme**	**N (%)**	**Theme**	**N (%)**
Rest	59 (27.6%)	Physiotherapy	49 (23.3%)	Medication	69 (30.7%)	Medication	61 (28.0%)	Medication	71 (32.7%)	Medication	83 (37.1%)
Physiotherapy	51 (23.8%)	Rest	47 (22.4%)	Rest	63 (28.0%)	Physiotherapy	52 (23.9%)	Rest	55 (25.3%)	Physiotherapy	56 (25.0%)
Medication	48 (22.4%)	Surgery	40 (19.0%)	Activity modification	31 (13.8%)	Surgery	40 (18.3%)	Physiotherapy	43 (19.8%)	Rest	42 (18.8%)
Activity modification	38 (17.8%)	Medication	36 (17.1%)	Exercise	31 (13.8%)	Exercise	34 (15.6%)	Exercise	43 (19.8%)	Exercise	34 (15.2%)
Injection	25 (11.7%)	Activity modification	30 (14.3%)	*Exercise (intensity not specified)*	16 (7.1%)	*Exercise (intensity not specified)*	25 (11.5%)	*Exercise (intensity not specified)*	32 (14.7%)	*Exercise (intensity not specified)*	19 (8.5%)
Exercise	25 (11.7%)	Exercise	26 (12.4%)	*Light exercise*	15 (6.7%)	*Light exercise*	9 (4.1%)	*Light exercise*	11 (5.1%)	*Light exercise*	15 (6.7%)
Exercise (intensity not specified)	19 (8.9%)	*Exercise (intensity not specified)*	15 (7.1%)	Physiotherapy	30 (13.3%)	Rest	34 (15.6%)	Heat	33 (15.2%)	Heat	24 (10.7%)
Light exercise	6 (2.8%)	*Light exercise*	11 (5.2%)	Injection	22 (9.8%)	Activity modification	19 (8.7%)	Cold	25 (11.5%)	Massage	22 (9.8%)
Surgery	21 (9.8%)	Heat	16 (7.6%)	Heat	20 (8.9%)	Injection	16 (7.3%)	Activity modification	20 (9.2%)	Injection	21 (9.4%)
Unsure	17 (7.9%)	Unsure	16 (7.6%)	Cold	18 (8.0%)	Investigations	16 (7.3%)	Massage	17 (7.8%)	Investigations	20 (8.9%)
Heat	14 (6.5%)	Wait and see	13 (6.2%)	Normal movements	16 (7.1%)	Irrelevant response	12 (5.5%)	Surgery	16 (7.4%)	Activity modification	18 (8.0%)
Doctor	12 (5.6%)	Injection	12 (5.7%)	Unsure	15 (6.7%)	Chiropractor	11 (5.0%)	Injection	14 (6.5%)	Cold	18 (8.0%)
Massage	12 (5.6%)	Massage	10 (4.8%)	Doctor	13 (5.8%)	Massage	11 (5.0%)	Topical treatments	14 (6.5%)	Doctor	14 (6.3%)
Cold	10 (4.7%)	Investigations	9 (4.3%)	Massage	11 (4.9%)	No treatment	11 (5.0%)	Doctor	12 (5.5%)	Topical treatments	14 (6.3%)
Normal movements	9 (4.2%)	No treatment	8 (3.8%)	Surgery	11 (4.9%)	Heat	10 (4.6%)	Unsure	11 (5.1%)	Surgery	13 (5.8%)
Investigations	7 (3.3%)	Normal movements	8 (3.8%)	No treatment	9 (4.0%)	Cold	9 (4.1%)	Investigations	10 (4.6%)	No treatment	8 (3.6%)
No treatment	7 (3.3%)	Topical treatments	7 (3.3%)	Investigations	7 (3.1%)	Normal movements	9 (4.1%)	Chiropractor	6 (2.8%)	Acupuncture	7 (3.1%)
Topical treatments	6 (2.8%)	Cold	6 (2.9%)	Wait and see	6 (2.7%)	Topical treatments	9 (4.1%)	Immobilisation	6 (2.8%)	Chiropractor	6 (2.7%)

Wait and see	6 (2.8%)	Acupuncture	5 (2.4%)	Specialist	5 (2.2%)	Unsure	9 (4.1%)	Irrelevant response	6 (2.8%)	Normal movements	6 (2.7%)
Acupuncture	4 (1.9%)	Doctor	5 (2.4%)	Topical treatments	5 (2.2%)	Doctor	5 (2.3%)	Normal movements	6 (2.8%)	Unsure	6 (2.7%)
Hydrotherapy	4 (1.9%)	Irrelevant response	5 (2.4%)	Electrotherapy	4 (1.8%)	Wait and see	5 (2.3%)	No treatment	5 (2.3%)	Irrelevant response	5 (2.2%)
Irrelevant response	4 (1.9%)	Specialist	5 (2.4%)	Chiropractor	3 (1.3%)	Acupuncture	3 (1.4%)	Wait and see	5 (2.3%)	Immobilisation	4 (1.8%)
Specialist	2 (0.9%)	Taping/bracing	5 (2.4%)	Hydrotherapy	3 (1.3%)	Taping/bracing	3 (1.4%)	Compression	3 (1.4%)	Diet	3 (1.3%)
Chiropractor	1 (0.5%)	Immobilisation	4 (1.9%)	Irrelevant response	3 (1.3%)	Diet	1 (0.5%)	Natural or unknown therapies	3 (1.4%)	Manipulation	2 (0.9%)
Compression	1 (0.5%)	Chiropractor	2 (1.0%)	Natural or unknown therapies	3 (1.3%)	Hydrotherapy	1 (0.5%)	Acupuncture	2 (0.9%)	Second opinion	2 (0.9%)
Ergonomics/posture	1 (0.5%)	Compression	2 (1.0%)	Prayer/hope/meditation	2 (0.9%)	Immobilisation	1 (0.5%)	Elevation	2 (0.9%)	Wait and see	2 (0.9%)
Good mattress	1 (0.5%)	Diet	2 (1.0%)	Taping/bracing	2 (0.9%)	Manipulation	1 (0.5%)	Taping/bracing	2 (0.9%)	Natural or unknown therapies	1 (0.4%)
Natural or unknown therapies	1 (0.5%)	Time off work	2 (1.0%)	Time off work	2 (0.9%)	Pain clinic	1 (0.5%)	Electrotherapy	1 (0.5%)	Osteopathy	1 (0.4%)
Taping/bracing	1 (0.5%)	Cognitive behavioural therapy	1 (0.5%)	Acupuncture	1 (0.4%)	Natural or unknown therapies	1 (0.5%)	Emergency department/hospital	1 (0.5%)	Prayer/hope/meditation	1 (0.4%)
Time off work	1 (0.5%)	Manipulation	1 (0.5%)	Compression	1 (0.4%)	Osteopathy	1 (0.5%)	Ergonomics/posture	1 (0.5%)	Specialist	1 (0.4%)
Cognitive behavioural therapy	0 (0.0%)	Second opinion	1 (0.5%)	Elevation	1 (0.4%)	Prayer/hope/meditation	1 (0.5%)	Hydrotherapy	1 (0.5%)	Taping/bracing	1 (0.4%)
Diet	0 (0.0%)	Electrotherapy	0 (0.0%)	Emergency department/hospital	1 (0.4%)	Second opinion	1 (0.5%)	Manipulation	1 (0.5%)	Stay healthy	1 (0.4%)
Electrotherapy	0 (0.0%)	Elevation	0 (0.0%)	Ergonomics/posture	1 (0.4%)	Specialist	1 (0.5%)	Prayer/hope/meditation	1 (0.5%)	Cognitive behavioural therapy	0 (0.0%)
Elevation	0 (0.0%)	Emergency department/hospital	0 (0.0%)	Immobilisation	1 (0.4%)	Time off work	1 (0.5%)	Specialist	1 (0.5%)	Compression	0 (0.0%)

Emergency department/hospital	0 (0.0%)	Ergonomics/posture	0 (0.0%)	Osteopathy	1 (0.4%)	Cognitive behavioural therapy	0 (0.0%)	Time off work	1 (0.5%)	Electrotherapy	0 (0.0%)
Immobilisation	0 (0.0%)	Good mattress	0 (0.0%)	Stay healthy	1 (0.4%)	Compression	0 (0.0%)	Stay healthy	1 (0.5%)	Elevation	0 (0.0%)
Manipulation	0 (0.0%)	Hydrotherapy	0 (0.0%)	Cognitive behavioural therapy	0 (0.0%)	Electrotherapy	0 (0.0%)	Cognitive behavioural therapy	0 (0.0%)	Emergency department/hospital	0 (0.0%)
Pain clinic	0 (0.0%)	Pain clinic	0 (0.0%)	Diet	0 (0.0%)	Elevation	0 (0.0%)	Diet	0 (0.0%)	Ergonomics/posture	0 (0.0%)
Osteopathy	0 (0.0%)	Natural or unknown therapies	0 (0.0%)	Good mattress	0 (0.0%)	Emergency department/hospital	0 (0.0%)	Good mattress	0 (0.0%)	Good mattress	0 (0.0%)
Prayer/hope/meditation	0 (0.0%)	Osteopathy	0 (0.0%)	Manipulation	0 (0.0%)	Ergonomics/posture	0 (0.0%)	Pain clinic	0 (0.0%)	Hydrotherapy	0 (0.0%)
Second opinion	0 (0.0%)	Prayer/hope/meditation	0 (0.0%)	Pain clinic	0 (0.0%)	Good mattress	0 (0.0%)	Osteopathy	0 (0.0%)	Pain clinic	0 (0.0%)
Stay healthy	0 (0.0%)	Stay healthy	0 (0.0%)	Second opinion	0 (0.0%)	Stay healthy	0 (0.0%)	Second opinion	0 (0.0%)	Time off work	0 (0.0%)

N: number of participants.

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Evidence
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Pg1.
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Pg2.
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Pg4-5. Introduction
Objectives	3	State specific objectives, including any prespecified hypotheses	Pg 5.
Methods			
Study design	4	Present key elements of study design early in the paper	Pg 5-6. Study design
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Pg6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	Pg 6. Participants and recruitment
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Pg6-7. Data collection
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Pg6-7. Data collection
Bias	9	Describe any efforts to address potential sources of bias	Pg 10-11. Data analysis
Study size	10	Explain how the study size was arrived at	Pg 6. Participants and recruitment
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Pg 10-11. Data analysis
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Pg 10-11. Data analysis

		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	N/A
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Pg 11. Results
		(b) Give reasons for non-participation at each stage	Pg 11.
		(c) Consider use of a flow diagram	Figure 1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	N/A
		(b) Indicate number of participants with missing data for each variable of interest	N/A
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	N/A
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	*N/A*
		Cross-sectional study—Report numbers of outcome events or summary measures	Pg 12-13. Results
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	N/A
		(*b*) Report category boundaries when continuous variables were categorized	N/A
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Pg 13-14. Discussion.
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Pg 14-15.
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pg13-18
Generalisability	21	Discuss the generalisability (external validity) of the study results	Pg13-18

Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Pg20.

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

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How do people perceive different labels for rotator cuff disease? A content analysis of data collected in a randomised controlled experiment

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ABSTRACT

Objectives: Explore how people perceive different labels for rotator cuff disease in terms of words or feelings evoked by the label and treatments they feel are needed. **Setting:** We performed a content analysis of qualitative data collected in a six-arm, online randomised controlled experiment.

Participants: 1,308 people with and without shoulder pain read a vignette describing a patient with rotator cuff disease and were randomised to one of six labels: *subacromial impingement syndrome, rotator cuff tear, bursitis, rotator-cuff-related shoulder pain, shoulder sprain* and *episode of shoulder pain*.

Primary and secondary outcomes: Participants answered two questions (free-text response) about: 1) words or feelings evoked by the label; 2) what treatments they feel are needed. Two researchers iteratively developed coding frameworks to analyse responses. **Results:** 1,308/1,626 (80%) complete responses for each question were analysed. Psychological distress (21%), uncertainty (22%), serious condition (15%), and poor prognosis (9%) were most often expressed by those labelled with *subacromial impingement syndrome*. For those labelled with a *rotator cuff tear,* psychological distress (13%), serious condition (9%) and poor prognosis (8%) were relatively common, while minor issue was expressed least often compared to the other labels (5%). Treatment/investigation and surgery were common among those labelled with a *rotator cuff tear* (11% and 19%, respectively) and *subacromial impingement syndrome* (9% and 10%) compared to *bursitis* (7% and 5%).

Conclusions: Words or feelings evoked by certain labels for rotator cuff disease and perceived treatment needs may explain why some labels drive management preferences towards surgery and imaging more than others.

Key words: rotator cuff; shoulder pain; subacromial impingement; bursitis; labelling.

Strengths and limitations of the study

- Our study used a large sample size and a highly reliable coding frameworks (k=0.90 to 0.97 across labelling groups for both questions)
- The online experiment which provided data for this study used randomisation and allocation concealment
- Since this is an online experiment, people's feelings towards different labels and what treatments they feel are needed might be different in a real-life clinical encounter
- Other labels not investigated in this study (e.g. rotator cuff disease, painful arc syndrome) may have provoked different words or feelings and perceived treatment needs
- We only focused on the feelings and needs of patients and the public, whereas clinician-related factors (e.g. beliefs, bias) might be a stronger driver of management choices in real-life

1. Introduction

Shoulder pain is the third most common musculoskeletal condition seen in primary care [1]. The one-year and lifetime prevalence of shoulder pain ranges from 5-47% and 7-67%, respectively [2]. Rotator cuff disease, an umbrella term that encompasses conditions relating to the rotator cuff and surrounding structures (including rotator cuff tendinopathy and tears, calcific tendinitis and subacromial bursitis) accounts for 85% of cases of shoulder pain [3]. Other causes of shoulder pain include adhesive capsulitis, glenohumeral osteoarthritis, fracture, dislocation and instability, malignancy and referred pain from visceral causes [4].

Neither clinical features nor diagnostic imaging can reliably pinpoint a specific nociceptive cause of rotator cuff disease from the numerous candidate pain-sensitive structures in the shoulder (e.g. tendon, bursa) [5-11]. Possibly as a result of such uncertainty, there are a plethora of diagnostic labels that have been used in both routine practice and research to indicate the same condition [12]. Some labels describe the clinical features (e.g. painful arc syndrome), the purported or observed pathology (e.g. rotator cuff tear), or the presumed aetiology (e.g. subacromial impingement syndrome).

Different labels for the same condition can influence people's management preferences, psychological outcomes and perceptions of condition severity [13]. For example, we recently conducted a large online randomised controlled experiment in people with and without shoulder pain (n=1,308) to explore whether different labels for rotator cuff disease influence people's management preferences. People told they had a *rotator cuff tear* had higher perceived need for both surgery and imaging compared to those told they had *bursitis*, and those told they had *subacromial impingement syndrome* had higher perceived need for imaging compared to those told they had *bursitis* [14].

Shoulder surgeries such as subacromial decompression and rotator cuff repair [15-20] are frequently performed for patients with rotator cuff disease [15-18], but current evidence indicates these procedures are not superior to placebo or non-operative management [19, 20]. Diagnostic imaging is also unnecessary for most patients with rotator cuff disease because it cannot reliably identify a specific nociceptive cause of rotator cuff disease, it does not inform management decisions, and can encourage use of surgery by identifying 'incidentalomas'[7-11]. Despite this, clinicians frequently order imaging [21, 22]. Our trial identified labels for rotator cuff disease that reduce people's perceived need for shoulder surgery and imaging. These findings could be an important starting point for reducing unnecessary healthcare for shoulder pain.

As part of our online randomised controlled experiment [14], we collected qualitative data that could help to uncover why preferences differed based upon the diagnostic label people received. The aim of this study was to explore how people with and without shoulder pain in our online experiment perceived different labels for rotator cuff disease in terms of words or feelings evoked by the label and treatments they feel are needed.

2. Materials and methods

2.1. Study design

We performed a content analysis of qualitative data collected in a six-arm, online randomised controlled experiment in participants with and without shoulder pain [14]. The study was approved by the University of Sydney Human Research Ethics Committee (Reference number: 2020/159). Informed consent was obtained from all participants.

2.2. Participants and recruitment

Participants aged 18-65 years old from Australia, New Zealand, United States, United Kingdom, and Canada were recruited through Qualtrics (www.qualtrics.com) between April

and June 2020. Qualtrics is a market research company that recruits using existing, nationally representative panels of individuals who have previously agreed to complete surveys. Qualtrics employs random sampling and provides incentives for participants to complete surveys (e.g. cash, airline miles, gift cards). Details on the sampling and recruitment procedures Qualtrics use are reported elsewhere [14, 23]. Qualtrics recruited three groups of participants (evenly distributed) for our study: those who had never experienced shoulder pain, those who had shoulder pain at the time of participation, and those who had previously experienced shoulder pain but were pain-free at the time of participation.

2.3. Data collection

Participants provided data on demographics, and if applicable, healthcare utilization and shoulder symptoms. This included data on age, gender, educational attainment, country of residence, employment status, private health insurance status, symptoms of anxiety and depression, history of shoulder pain, history of diagnostic imaging for shoulder pain (X-ray, ultrasound, MRI), history of injections for shoulder pain, history of shoulder surgery, history of sick leave due to shoulder pain, history of receiving a diagnosis for shoulder pain, duration of current shoulder pain, and shoulder pain and disability index (SPADI) scores. Detail on how these data were collected are reported elsewhere [14].

Participants read a vignette describing a patient with rotator cuff disease and were randomised to one of six labels. Randomisation was not stratified by the three groups of participants with different experiences of shoulder pain. Each label was accompanied by a brief explanation of the label:

- "Subacromial impingement syndrome. Subacromial impingement syndrome describes shoulder pain caused by compression of soft tissue (e.g. tendons, bursa) from bony parts of the shoulder."

- "Rotator cuff tear. A rotator cuff tear is a tear in one of the shoulder tendons."
- "Bursitis. Bursitis is inflammation of a fluid-filled sac called a bursa in the shoulder."
- "Rotator-cuff-related shoulder pain. Rotator-cuff-related shoulder pain describes shoulder pain caused by an injury to one of the shoulder tendons."
- "Shoulder sprain. Shoulder sprain describes shoulder pain caused by a sprain of either muscles, ligaments and/or tendons that support the shoulder."
- "Episode of shoulder pain" (control label; no explanation provided).

In the vignette, the health professional described all labels as non-serious and likely to resolve over time (Box 1).

Box 1. Vignette.

You have shoulder pain

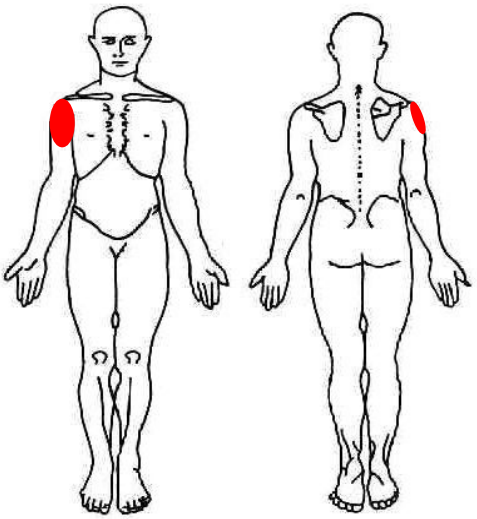
This next section describes a person with shoulder pain who goes to a health care provider.

We want you to put yourself into this scenario, and do your best to imagine that you are the person having this shoulder pain.

After reading it, you will be asked a number of questions. Please do your best to answer them based on this imagined scenario.

Your shoulder pain

- **Imagine you are suffering from pain in your right shoulder**
- It started 2 months ago
- There was no specific incident/injury/trauma that caused your pain
- You think the pain was triggered by reaching for a plate in a high cupboard, but you are not sure
- You have no pain or other unusual sensations past your shoulder (e.g. pins and needles, numbness)
- The pain is at the front, side and back of your right shoulder and right upper arm, as shown by the **red circles on the picture of the body chart below**
- You find it hard to move your shoulder normally. In particular, you find it very hard to lift your right arm past horizontal ('eye level') and reach up to high cupboards
- You cannot lie on your right side in bed as this increases your pain
- You have used heat and over the counter pain relievers, and have been avoiding using your right shoulder to reach for objects or carry heavy shopping



You visit a healthcare provider (e.g. general practitioner or physiotherapist)

Your health care provider asks you questions about your shoulder pain, and some health questions to rule out any worrying causes

Your health care provider does a detailed physical examination. It involves:

- Looking at your shoulder
- Checking if you can move your shoulder in certain directions, and whether this causes pain
- Checking if they can move your shoulder in certain directions, and whether this causes pain
- Checking if movement of your shoulder against resistance causes pain

AFTER THIS, YOUR HEALTH CARE PROVIDER TELLS YOU:

"You have [label]"

"I am not worried that there is anything serious going on here because your pain is not related to severe trauma. I am also not worried that you have arthritis in your shoulder or a specific condition called frozen shoulder that causes severe pain and stiffness. Your pain should gradually improve over time by itself. It is recommended that you temporarily avoid activities that aggravate your pain and continue to use your arm so your shoulder does not stiffen up."

This vignette was originally published in the Journal of Orthopaedic & Sports Physical Therapy [14]. They own the copyright to this material.

Outcome data were collected immediately after participants were randomised to a label. In this paper, we focus on free-text responses to two questions:

1. *When you hear the term [one of the six labels], what words or feelings does this make you think of? Please list.*
2. *What treatment (s) (if any) do you think a person with a [one of the six labels] needs? Please list.*

2.4. Data analysis

Free-text responses to the above questions were analysed using content analysis. Content analysis combines quantitative and qualitative research methods and is a well-accepted approach for analysing text data [24]. Content analysis allowed us to report the frequency of themes expressed in responses. Two researchers with experience in qualitative research and a physiotherapy background (JZ and ZAM) initially read through the responses to become familiar with their content. As such, the analysis represents the perspectives of physiotherapists currently working in research and with extensive experience managing patients with musculoskeletal pain. To develop the coding frameworks (one for each question), an inductive approach embedded in grounded theory was used. The two researchers independently coded 50 responses from each labelling group for both questions (~24% of all responses). The frameworks were then compared, discussed and harmonised into one framework for each question for the next stage of coding.

Once the frameworks had been developed, the two researchers independently applied the frameworks to a random sample of responses, ensuring at least 20% of responses from each labelling group were coded. Each response was allocated as many codes as appropriate; nine was the highest number of codes given to a single response. The development and use of the frameworks occurred between July and August 2020. Kappa statistics (k) and 95% confidence intervals (CI) and exact agreement (%) were calculated to assess the level of agreement

between JZ and ZAM for coding responses to both questions. k values were interpreted as: <0.00='poor', 0.00 to 0.20='slight', 0.21 to 0.40='fair', 0.41 to 0.60='moderate', 0.61 to 0.80='substantial' and ≥0.81='almost perfect' [25]. Analyses investigating level of agreement were performed using Stata (V.16.1) and 5,000 bootstrap replications were used to calculate 95% CI. Reliability of the coding framework was deemed acceptable if level of agreement between the two researchers coding a random sample of responses was k≥0.8. Once agreement was acceptable, the two researchers (JZ and ZM) applied the framework to the remaining responses. A detailed outline of the final coding frameworks is presented in Supplementary Table 1.

2.5. Patient or Public Involvement

Patients and members of the public were not involved in the design of this study nor were they involved in the validation of the data.

3. Results

3.1. Sample characteristics and level of agreement

In our online trial, 1,626 eligible participants were randomised to the six labelling arms (Figure 1). 318 participants (19.6%) did not respond to the free-text response questions, leaving 1,308 (80.4%) responses to each question for inclusion in the analysis (2,618 total responses). Level of agreement between the two researchers coding a random sample of responses was 'almost perfect' for question 1 (range across the six labelling groups: k=0.90 to 0.97) and question 2 (k=0.91 to 0.97) (Supplementary Table 2).

Characteristics of the sample are reported in Table 1. In summary, there were 437 (33.4%) participants with no history of shoulder pain, 434 (33.2%) currently experiencing shoulder pain, and 437 (33.4%) with a history of shoulder pain but currently pain free. Participants' mean age (SD) was 40.3 (16.0) years and 59.1% were females. For participants with previous

or current shoulder pain, 65.6% had received treatment for their shoulder pain and 27.7% had been given a specific diagnosis, 44.4% had received imaging, 21.2% an injection and 8.7% surgery for their shoulder pain. Characteristics were largely similar between the six labelling groups.

3.2. When you hear the term [one of the six labels], what words or feelings does this make you think of?

Our framework included 15 themes (Table 2). Supplementary Table 3 provides examples of participants' free-text responses for this question. Pain experience was the most common theme across all labelling groups (30.8-59.4% of responses). Activity restriction was most often expressed by participants labelled with a *shoulder sprain* (25.8%), *rotator-cuff-related shoulder pain* (21.1%) and *episode of shoulder pain* (18.3%). Tissue damage or dysfunction was most often expressed by participants labelled with *bursitis* (36.0%), *rotator cuff tear* (21.9%) and *shoulder spain* (20.7%).

Uncertainty was most often expressed by participants labelled with *subacromial impingement syndrome* (22.0%) and *bursitis* (13.3%), and least often expressed by those labelled with a *rotator cuff tear* (4.8%) and *shoulder sprain* (0.9%). Psychological distress (20.6%) and serious issue (15.4%) were most often expressed by participants labelled with *subacromial impingement syndrome*; serious issue was least often expressed by those labelled with *bursitis* (2.7%), *rotator-cuff-related shoulder pain* (4.1%), *shoulder sprain* (2.3%), and *episode of shoulder pain* (0.9%) (Table 2).

Good prognosis was most often expressed by participants labelled with an *episode of shoulder pain* (17.4%) and *shoulder sprain* (16.6%), and least often expressed by those labelled with *subacromial impingement syndrome* (4.7%) and *rotator-cuff-related shoulder pain* (4.1%). Poor prognosis was most often expressed by participants labelled with *subacromial*

impingement syndrome (9.3%) and *rotator cuff tear* (8.1%), and least often expressed by those labelled with *bursitis* (2.7%) and *episode of shoulder pain* (3.1%). Treatment/investigation was most often expressed by participants labelled with a *rotator cuff tear* (11.0%) and *rotator-cuff-related shoulder pain* (9.6%). Minor issue was most often expressed by participants labelled with a *shoulder sprain* (12.9%), and least often expressed by those labelled with a *rotator cuff tear* (4.8%) (Table 2).

3.3. What treatment (s) (if any) do you think a person with [one of the six labels] needs?

Our framework included 41 themes. The most common treatment themes expressed across the labels were medication (17.1–37.1% of responses), rest (15.6–28.0%), physiotherapy (13.3–25.0%) and exercise (11.7–19.8%). Surgery was most often expressed by participants labelled with a *rotator cuff tear* (19.0%) and *rotator-cuff-related shoulder pain* (18.3%), and least often expressed by those labelled with *bursitis* (4.9%) and *episode of shoulder pain* (5.8%). Injection was most often expressed by participants labelled with *subacromial impingement syndrome* (11.7%), *bursitis* (9.8%) and *episode of shoulder pain* (9.4%), and least often expressed by those labelled with a *rotator cuff tear* (5.7%). Investigation was most often expressed by participants labelled with an *episode of shoulder pain* (8.9%) and *rotator-cuff-related shoulder pain* (7.3%), and was expressed by 3.1-4.6% of participants across the other labels (Table 3 & Table 4; Supplementary Table 4).

4. Discussion

4.1. Summary of key findings

There was a variety of themes elicited from the two questions regarding words or feelings evoked by the diagnostic label and treatments perceived as necessary for rotator cuff disease. The findings could explain why, in the quantitative part of our trial [14], participants labelled with *subacromial impingement syndrome* had higher perceived need for imaging when

compared to those labelled with *bursitis,* and those labelled with a *rotator cuff tear* had higher perceived need for surgery and imaging when compared to those labelled with *bursitis*. Feelings of psychological distress, uncertainty, and that the condition is serious and has a poor prognosis were commonly expressed by those labelled with *subacromial impingement syndrome*. For those labelled with a *rotator cuff tear,* feelings of psychological distress, and that the condition is serious and has a poor prognosis were relatively common, while few perceived it as a minor issue. Although feelings of tissue damage or dysfunction were expressed most often by participants labelled with *bursitis*, it was uncommon for participants to perceive *bursitis* as a serious condition, a condition with a poor prognosis or a condition associated with psychological distress. These themes might explain why the need for treatment/investigation and surgery were more common among those labelled with a *rotator cuff tear* and *subacromial impingement syndrome* compared to *bursitis*.

4.2. Strengths and weaknesses of this study

Key strengths of this study include use of a large sample size, highly reliable coding frameworks (k=0.90 to 0.97 across labelling groups for both questions) and including people with and without shoulder pain. Including people with and without the target health condition is important when trying to explore the perceptions of both patients and the general public, yet it is uncommon in labelling studies [13, 26-29]. Another strength is that the online experiment which provided data for this study used high-quality methods (e.g. randomisation, allocation concealment).

The main weakness of this study is that it was an online experiment; hence, people's feelings towards different labels and what treatments they feel are needed might be different in a clinical encounter. Other labels not investigated in this study (e.g. rotator cuff disease, painful arc syndrome) may have provoked different words or feelings and perceived treatment needs. We

were missing data from 318 participants who were randomised but did not complete outcome measures. However, our sample appears representative of people presenting with shoulder pain in primary care in terms of demographics, healthcare utilisation, and shoulder pain and function [3, 30-33]. Outcomes were only assessed immediately after participants were given the label. Our findings may have been different if we gave participants more time to reflect on their label. Since the health professional in the vignette was not concerned about any label, participants may have had fewer negative feelings towards the labels and felt extensive treatment was unnecessary. Very low health literacy may have also limited understanding of the message from the health professional in the vignette. The need for investigation may have been low in response to the second question (3.1-8.9%) because the question only referred to what 'treatments' a person needs. This study only focused on the feelings and needs of patients and the public, whereas clinician-related factors (e.g. beliefs, bias) might be a stronger driver of management choices in the real world. Finally, since two researchers, both with a physiotherapy background developed and applied the coding frameworks, it is possible professional bias and beliefs may have influenced the coding.

4.3. Meaning of the study

The qualitative findings from our online randomised controlled experiment (i.e. the current content analysis) corroborate with the quantitative findings [14] and highlights the potential value of avoiding certain labels for rotator cuff disease. Our online experiment found participants labelled with a *rotator cuff tear* had higher perceived need for surgery and imaging when compared to those labelled with *bursitis*, while those labelled with *subacromial impingement syndrome* had higher perceived need for imaging when compared to those labelled with *bursitis*. In this content analysis, participants labelled with *subacromial impingement syndrome* and *rotator cuff tear* were more likely to associate these labels with

psychological distress, a serious condition, poor prognosis and the need for treatment/investigation and surgery, compared to those labelled with *bursitis*.

Encouraging clinicians to avoid labels that increase patients' perceived need for unnecessary care, such as shoulder surgery and diagnostic imaging, could improve the management of patients with rotator cuff disease. However, since there are no data on the acceptability of avoiding certain labels among patients and health professionals, educating clinicians on the importance of addressing misconceptions among patients with rotator cuff disease may be a more acceptable starting point. For example, patients labelled with *subacromial impingement syndrome* may need reassurance that they do not have a serious condition and education to reduce any psychological distress or uncertainty. Similarly, patients labelled with a *rotator cuff tear* may need reassurance that tears rarely need to be repaired because they are common in asymptomatic people and symptoms associated with tears often improve without surgery.

4.4. Comparison to existing literature

Although this is the first study to examine public and patient perceptions of different labels for rotator cuff disease, the findings align with qualitative work which suggests patients given a structural diagnosis (e.g. subacromial impingement syndrome, where pain is caused by a bone spur that is reducing the subacromial space) believe surgery will fix their problem [34]. We found perceived need for treatment/investigation was most common among those labelled with a *rotator cuff tear* (11.0%) and *subacromial impingement syndrome* (9.3%). Further, surgery was most often expressed by those labelled with a *rotator cuff tear* (19.0%).

The findings of this study also align with a content analysis conducted by our group exploring public and patient perceptions of different labels for low back pain (O'Keeffe M, et al. Public and patient perceptions of diagnostic labels for low back pain: a content analysis. Under review). The study analysed free-text responses to two questions (identical to the questions

asked in this study) which were collected in a six-arm, online randomised controlled experiment in participants with and without low back pain. Feelings of a poor prognosis was most common among participants labelled with a *disc bulge*, *degeneration* and *arthritis*, while feelings of a good prognosis was most common among those labelled with *lumbar sprain*, *non-specific low back pain* and an *episode of low back pain*. This is similar to our study where 'poor prognosis' was often expressed by participants given structural labels for rotator cuff disease (e.g. *subacromial impingement syndrome*) and 'good prognosis' was often expressed by those given non-specific labels (e.g. *episode of shoulder pain, shoulder sprain*). *Bursitis* was the exception to this trend; a structural diagnosis that was rarely associated with 'poor prognosis' (2.7%).

Perceived treatment needs for low back pain and rotator cuff disease appear to be similar. The top four treatments in the low back pain content analysis were exercise, medication, rest and physiotherapy (O'Keeffe M, et al. Public and patient perceptions of diagnostic labels for low back pain: a content analysis. Under review). In this study, the top four treatments for rotator cuff disease were medication, rest, physiotherapy and exercise. One difference is that exercise appears to be a more acceptable treatment for low back pain. For both low back pain and rotator cuff disease, labels appear to influence participants' perceived need for surgery. For low back pain, surgery was perceived as necessary among participants labelled with *disc bulge*, *degeneration* and *arthritis* more often than it was among those labelled with *lumbar sprain*, *non-specific low back pain*, and an *episode of low back pain*. For rotator cuff disease, surgery was perceived as necessary among participants labelled with a *rotator cuff tear*, *rotator-cuff-related shoulder pain*, and (to a lesser extent) *subacromial pain syndrome* more often than it was among those labelled with *bursitis*, *shoulder sprain* and *episode of shoulder pain*.

4.5. Unanswered questions and future research

Although some labels provoked negative feelings and perceived need for unnecessary care more than others, we do not know whether health professionals would find avoiding certain labels acceptable. Qualitative research is needed to fill this important knowledge gap. Our quantitative analysis also found only small differences in patients' perceived need for surgery and imaging between certain labels; these differences may not be clinically meaningful. Providing context and explanation for imaging findings (i.e. that they are common in people without pain and in older people) and addressing misconceptions that are associated with certain labels might be more important for patients than avoiding certain labels. Testing these approaches should be a research priority.

5. Conclusion

Words or feelings evoked by certain labels for rotator cuff disease and perceived treatment needs may explain why some labels drive management preferences towards surgery and imaging more than others. Feelings of psychological distress and that the condition is serious and has a poor prognosis, and the need for treatment/investigation and surgery were common among those labelled with a *rotator cuff tear* and *subacromial impingement syndrome,* but not among those labelled with *bursitis*. The need for treatment/investigation and surgery were also more common among those labelled with a *rotator cuff tear* and *subacromial impingement syndrome* compared to *bursitis*. Interventions addressing misconceptions and perceived need for unnecessary care in patients given different labels for rotator cuff disease, and the clinicians who provide these labels, should be tested.

Authors' contributions

All authors critically revised the manuscript for important intellectual content and approved the final manuscript. Please find below a detailed description of the role of each author:

- Joshua R Zadro: conception and design, analysis and interpretation of data, drafting and revision of the manuscript, and final approval of the version to be published
- Zoe A Michaleff: conception and design, analysis and interpretation of data, drafting and revision of the manuscript, and final approval of the version to be published
- Mary O'Keeffe: conception and design, interpretation of data, drafting and revision of the manuscript and final approval of the version to be published
- Giovanni Ferreira: conception and design, interpretation of data, drafting and revision of the manuscript and final approval of the version to be published
- Romi Haas: conception and design, interpretation of data, drafting and revision of the manuscript and final approval of the version to be published
- Ian A Harris: conception and design, interpretation of data, drafting and revision of the manuscript and final approval of the version to be published
- Rachelle Buchbinder: conception and design, interpretation of data, drafting and revision of the manuscript and final approval of the version to be published
- Christopher G Maher: conception and design, interpretation of data, drafting and revision of the manuscript and final approval of the version to be published

The Corresponding Author (JZ) attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Data availability statement: Data is available on reasonable request.

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488

489 Table 1. Characteristics of participants

ALL PARTICIPANTS	Total sample (n=1,308)	Subacromial impingement syndrome (n=214)	Rotator cuff tear (n=210)	Bursitis (n=225)	Rotator-cuff-related shoulder pain (n=218)	Shoulder sprain (n=217)	Episode of shoulder pain (n=224)
Type of participant n (%)							
No history of shoulder pain	437 (33.4%)	74 (34.6%)	70 (33.3%)	67 (29.8%)	76 (34.9%)	74 (34.1%)	76 (33.9%)
Current shoulder pain	434 (33.2%)	67 (31.3%)	69 (32.9%)	72 (32.0%)	79 (36.2%)	68 (31.3%)	79 (35.3%)
History of shoulder pain (currently pain free)	437 (33.4%)	73 (34.1%)	71 (33.8%)	86 (3.2%)	63 (28.9%)	75 (34.6%)	69 (30.8%)
Age (years), mean (SD)	40.3 (16.0)	39.9 (15.6)	41.0 (16.4)	40.9 (15.0)	41.0 (17.3)	39.4 (16.5)	39.4 (15.4)
Female, n (%)	773 (59.1%)	132 (61.7%)	109 (51.9%)	132 (58.7%)	127 (58.3%)	131 (60.4%)	142 (63.4%)
Country, n (%)							
Australia	270 (20.6%)	42 (19.6%)	50 (23.8%)	39 (17.3%)	49 (22.5%)	47 (21.7%)	43 (19.2%)
New Zealand	224 (17.1%)	37 (17.3%)	30 (14.3%)	40 (17.8%)	35 (16.1%)	40 (18.4%)	42 (18.8%)
United States	273 (20.9%)	48 (22.4%)	39 (18.6%)	53 (23.6%)	47 (21.6%)	42 (19.4%)	44 (19.6%)
United Kingdom	270 (20.6%)	34 (15.9%)	43 (20.5%)	54 (24.0%)	46 (21.1%)	39 (18.0%)	54 (24.1%)
Canada	271 (20.7%)	53 (24.8%)	48 (22.9%)	39 (17.3%)	41 (18.8%)	49 (22.6%)	41 (18.3%)
Education, n (%)							
High school (not completed)	98 (7.5%)	10 (4.7%)	21 (10.0%)	13 (5.8%)	16 (7.3%)	20 (9.2%)	18 (8.0%)
High school (completed)	438 (33.5%)	78 (36.5%)	71 (33.8%)	55 (24.4%)	88 (40.4%)	70 (32.3%)	76 (33.9%)
Non-university tertiary education	175 (13.4%)	24 (11.2%)	22 (10.5%)	37 (16.4%)	32 (14.7%)	28 (12.9%)	32 (14.3%)
University	597 (45.6%)	102 (47.7%)	96 (45.7%)	120 (53.3%)	82 (37.6%)	99 (45.6%)	98 (43.8%)
Employment, n (%)							
Employed	792 (60.6%)	134 (62.6%)	132 (62.9%)	142 (63.1%)	138 (63.3%)	125 (57.6%)	121 (54.0%)
Unemployed	303 (23.2%)	53 (24.8%)	46 (21.9%)	51 (22.7%)	39 (17.9%)	54 (24.9%)	60 (26.8%)
Student	62 (4.7%)	6 (2.8%)	9 (4.3%)	9 (4.0%)	9 (4.1%)	11 (5.1%)	18 (8.0%)
Retired	151 (11.5%)	21 (9.8%)	23 (11.0%)	23 (10.2%)	32 (14.7%)	27 (12.4%)	25 (11.2%)
Private health insurance, n (%)	563 (43.0%)	106 (49.5%)	94 (44.8%)	90 (40.0%)	91 (41.7%)	91 (41.9%)	91 (40.6%)

PARTICIPANTS WITH PREVIOUS OR CURRENT SHOULDER PAIN	Total sample (n=871)	Subacromial impingement syndrome (n=140)	Rotator cuff tear (n=140)	Bursitis (n=158)	Rotator-cuff-related shoulder pain (n=142)	Shoulder sprain (n=143)	Episode of shoulder pain (n=148)
Previous shoulder pain treatment, n (%)	571 (65.6%)	97 (69.3%)	87 (62.1%)	99 (62.7%)	99 (69.7%)	90 (63.0%)	99 (66.9%)
Previous shoulder surgery, n (%)	76 (8.7%)	12 (8.6%)	5 (3.6%)	13 (8.2%)	20 (14.1%)	13 (9.1%)	13 (8.8%)
Previous shoulder imaging, n (%)	387 (44.4%)	65 (46.4%)	56 (40.0%)	70 (44.3%)	74 (52.1%)	63 (44.1%)	59 (39.9%)
Previous shoulder injection, n (%)	185 (21.2%)	37 (26.4%)	24 (17.1%)	33 (20.9%)	34 (23.9%)	27 (18.9%)	30 (20.3%)
Previous sick leave for shoulder pain, n (%)	344 (39.5%)	58 (41.4%)	44 (31.4%)	62 (39.2%)	62 (43.7%)	55 (38.5%)	63 (42.6%)
Previous shoulder pain diagnosis, n (%)	241 (27.7%)	45 (32.1%)	31 (22.1%)	41 (26.0%)	42 (29.6%)	42 (29.4%)	40 (27.0%)
PARTICIPANTS WITH CURRENT SHOULDER PAIN	**Total sample (n=434)**	**Subacromial impingement syndrome (n=67)**	**Rotator cuff tear (n=69)**	**Bursitis (n=72)**	**Rotator-cuff-related shoulder pain (n=79)**	**Shoulder sprain (n=68)**	**Episode of shoulder pain (n=79)**
Duration of current shoulder pain, n (%)							
Less than 1 week	61 (14.1%)	9 (13.4%)	13 (18.8%)	8 (11.1%)	11 (13.9%)	11 (16.2%)	9 (11.4%)
1 week to 3 months	161 (37.1%)	27 (40.3%)	26 (37.8%)	21 (29.2%)	32 (40.5%)	24 (35.3%)	31 (39.2%)
4 months to 12 months	62 (14.3%)	10 (14.9%)	4 (5.8%)	19 (26.4%)	13 (16.5%)	8 (11.8%)	8 (10.1%)
Longer than 12 months	150 (34.6%)	21 (31.3%)	26 (37.7%)	24 (33.3%)	23 (29.1%)	25 (36.8%)	31 (39.2%)
Total SPADI (0-100), mean (SD)	53.1 (21.0)	58.8 (20.7)	52.1 (22.0)	54.3 (21.7)	51.6 (19.1)	52.5 (20.0)	49.9 (22.2)
Pain subscore (0-100)	58.5 (19.9)	63.7 (19.4)	56.3 (21.8)	60.1 (18.9)	57.2 (17.7)	58.7 (19.7)	55.7 (21.1)
Disability subscore (0-100)	47.7 (24.4)	53.9 (23.4)	47.8 (24.6)	48.5 (26.8)	46.0 (22.7)	46.4 (23.2)	44.1 (25.2)

n: number of participants; SD: standard deviation; SPADI: Shoulder Pain and Disabilty Index.

Table 2. Themes for words or feelings across all labels

Theme	Total sample (n=1,308)	Subacromial impingement syndrome (n=214)	Rotator cuff tear (n=210)	Bursitis (n=225)	Rotator-cuff-related shoulder pain (n=218)	Shoulder sprain (n=217)	Episode of shoulder pain (n=224)
1	Pain experience (n=637, 48.7%)	Pain experience (n=66, 30.8%)	Pain experience (n=105, 50.0%)	Pain experience (n=106, 47.1%)	Pain experience (n=106, 48.6%)	Pain experience (n=129, 59.4%)	Pain experience (n=125, 55.8%)
2	Tissue damage or dysfunction (n=278, 21.3%)	Uncertainty (n=47, 22.0%)	Tissue damage or dysfunction (n=46, 21.9%)	Tissue damage or dysfunction (n=81, 36.0%)	Activity restriction (n=46, 21.1%)	Activity restriction (n=56, 25.8%)	Activity restriction (n=41, 18.3%)
3	Activity restriction (n=207, 15.8%)	Psychological distress (n=44, 20.6%)	Activity restriction (n=29, 13.8%)	Uncertainty (n=30, 13.3%)	Tissue damage or dysfunction (n=36, 16.5%)	Tissue damage or dysfunction (n=45, 20.7%)	Good prognosis (n=39, 17.4%)
4	Psychological distress (n=157, 12.0%)	Tissue damage or dysfunction (n=43, 20.1%)	Psychological distress (n=27, 12.9%)	Activity restriction (n=20, 8.9%)	Psychological distress (n=30, 13.8%)	Good prognosis (n=36, 16.6%)	Tissue damage or dysfunction (n=27, 12.1%)
5	Good prognosis (n=123, 9.4%)	Serious issue (n=33, 15.4%)	Treatment/investigation (n=23, 11.0%)	Psychological distress (n=19, 8.4%)	Treatment/investigation (n=21, 9.6%)	Minor issue (n=28, 12.9%)	Psychological distress (n=25, 11.2%)
6	Uncertainty (n=114, 8.7%)	Minor issue (n=21, 9.8%)	Unhappy/frustration (n=21, 10.0%)	Irrelevant response (n=17, 7.6%)	Minor issue (n=19, 8.7%)	Mechanism of injury (n=21, 9.7%)	Minor issue (n=22, 9.8%)
7	Minor issue (n=113, 8.6%)	Treatment/investigation (n=20, 9.3%)	Serious issue (n=19, 9.0%)	Treatment/investigation (n=16, 7.1%)	Uncertainty (n=17, 7.8%)	Unhappy/frustration (n=20, 9.2%)	Treatment/investigation (n=17, 7.6%)
8	Treatment/investigation (n=112, 8.6%)	Poor prognosis (n=20, 9.3%)	Poor prognosis (n=17, 8.1%)	Good prognosis (n=14, 6.2%)	Mechanism of injury (n=14, 6.4%)	Treatment/investigation (n=15, 6.9%)	Unhappy/frustration (n=17, 7.6%)

9	Unhappy/frustration (n=84, 6.4%)	Activity restriction (n=15, 7.0%)	Good prognosis (n=15, 7.1%)	Minor issue (n=13, 5.8%)	Poor prognosis (n=12, 5.5%)	Psychological distress (n=12, 5.5%)	Mechanism of injury (n=13, 5.8%)
10	Serious issue (n=74, 5.7%)	Unhappy/frustration (n=11, 5.1%)	Mechanism of injury (n=12, 5.7%)	Unhappy/frustration (n=8, 3.6%)	Irrelevant response (n=10, 4.6%)	Poor prognosis (n=8, 3.7%)	Uncertainty (n=8, 3.6%)
11	Mechanism of injury (n=72, 5.5%)	Good prognosis (n=10, 4.7%)	Uncertainty (n=10, 4.8%)	Mechanism of injury (n=7, 3.1%)	Good prognosis (n=9, 4.1%)	Serious issue (n=5, 2.3%)	Feels dismissed (n=8, 3.6%)
12	Poor prognosis (n=70, 5.4%)	Mechanism of injury (n=5, 2.3%)	Minor issue (n=10, 4.8%)	Serious issue (n=6, 2.7%)	Serious issue (n=9, 4.1%)	Irrelevant response (n=3, 1.4%)	Poor prognosis (n=7, 3.1%)
13	Irrelevant response (n=47, 3.6%)	Irrelevant response (n=4, 1.9%)	Irrelevant response (n=6, 2.9%)	Poor prognosis (n=6, 2.7%)	Unhappy/frustration (n=7, 3.2%)	Uncertainty (n=2, 0.9%)	Irrelevant response (n=7, 3.1%)
14	Feels dismissed (n=12, 0.9%)	Feels dismissed (n=2, 0.9%)	Aging (n=1, 0.5%)	Aging (n=5, 2.2%)	Aging (n=1, 0.5%)	Feels dismissed (n=2, 0.9%)	Serious issue (n=2, 0.9%)
15	Aging (n=9, 0.7%)	Aging (n=1, 0.5%)	Feels dismissed (n=0, 0%)	Feels dismissed (n=0, 0%)	Feels dismissed (n=0, 0%)	Aging (n=1, 0.5%)	Aging (n=0, 0%)

0 – 4.9%	**5 – 9.9%**	**10 – 14.9%**	**15 – 24.9%**	**25% +**

Table 3. Top 10 treatment themes for each label

Theme	Subacromial impingement syndrome (n=214)	Rotator cuff tear (n=210)	Bursitis (n=225)	Rotator-cuff-related shoulder pain (n=218)	Shoulder sprain (n=217)	Episode of shoulder pain (n=224)
1	Rest (n=59, 27.6%)	Physiotherapy (n=49, 23.3%)	Medication (n=69, 30.7%)	Medication (n=61, 28.0%)	Medication (n=71, 32.7%)	Medication (n=83, 37.1%)
2	Physiotherapy (n=51, 23.8%)	Rest (n=47, 22.4%)	Rest (n=63, 28.0%)	Physiotherapy (n=52, 23.9%)	Rest (n=55, 25.3%)	Physiotherapy (n=56, 25.0%)
3	Medication (n=48, 22.4%)	Surgery (n=40, 19.0%)	Activity modification (n=31, 13.8%)	Surgery (n=40, 18.3%)	Physiotherapy (n=43, 19.8%)	Rest (n=42, 18.8%)
4	Activity modification (n=38, 17.8%)	Medication (n=36, 17.1%)	Exercise (n=31, 13.8%)	Exercise (n=34, 15.6%)	Exercise (n=43, 19.8%)	Exercise (n=34, 15.2%)
5	Injection (n=25, 11.7%)	Activity modification (n=30, 14.3%)	Physiotherapy (n=30, 13.3%)	Rest (n=34, 15.6%)	Heat (n=33, 15.2%)	Heat (n=24, 10.7%)
6	Exercise (n=25, 11.7%)	Exercise (n=26, 12.4%)	Injection (n=22, 9.8%)	Exercise (intensity not specified) (n=25, 11.5%)	Exercise (intensity not specified) (n=32, 14.7%)	Massage (n=22, 9.8%)
7	Surgery (n=21, 9.8%)	Heat (n=16, 7.6%)	Heat (n=20, 8.9%)	Activity modification (n=19, 8.7%)	Cold (n=25, 11.5%)	Injection (n=21, 9.4%)
8	Exercise (intensity not specified) (n=19, 8.9%)	Unsure (n=16, 7.6%)	Cold (n=18, 8.0%)	Injection (n=16, 7.3%)	Activity modification (n=20, 9.2%)	Investigations (n=20, 8.9%)
9	Unsure (n=17, 7.9%)	Exercise (intensity not specified)	Exercise (intensity not specified)	Investigations (n=16, 7.3%)	Massage (n=17, 7.8%)	Exercise (intensity not specified)

		(n=15, 7.1%)	(n=16, 7.1%)			(n=19, 8.5%)
10	Heat (n=14, 6.5%)	Wait and see (n=13, 6.2%)	Normal movements (n=16, 7.1%)	Irrelevant response (n=12, 5.5%)	Surgery (n=16, 7.4%)	Activity modification (n=18, 8.0%)

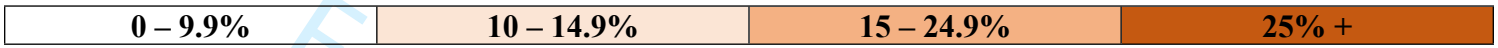

Table 4. All treatment themes from participants (n=1,308)

Treatment label	N (%)
Medication	368 (28.1%)
Rest	300 (22.9%)
Physiotherapy	281 (21.5%)
Exercise	193 (14.8%)
• Exercise (intensity not specified)	126 (9.6%)
• Light exercise	67 (5.1%)
Activity modification	156 (11.9%)
Surgery	141 (10.8%)
Heat	117 (8.9%)
Injection	110 (8.4%)
Cold	86 (6.6%)
Massage	83 (6.3%)
Unsure	74 (5.7%)
Investigations	69 (5.3%)
Doctor	61 (4.7%)
Topical treatments	55 (4.2%)
Normal movements	54 (4.1%)
No treatment	48 (3.7%)
Wait and see	37 (2.8%)
Irrelevant response	35 (2.7%)
Chiropractor	29 (2.2%)
Acupuncture	22 (1.7%)
Immobilisation	16 (1.2%)
Specialist	15 (1.1%)
Taping/bracing	14 (1.1%)
Hydrotherapy	9 (0.7%)
Natural or unknown therapies	9 (0.7%)
Compression	7 (0.5%)
Time off work	7 (0.5%)
Diet	6 (0.5%)
Electrotherapy	5 (0.4%)
Manipulation	5 (0.4%)
Prayer/hope/meditation	5 (0.4%)
Second opinion	4 (0.3%)
Elevation	3 (0.2%)
Ergonomics/posture	3 (0.2%)
Osteopathy	3 (0.2%)
Stay healthy	3 (0.2%)
Emergency department/hospital	2 (0.2%)
Cognitive behavioural therapy	1 (0.1%)
Good mattress	1 (0.1%)
Pain clinic	1 (0.1%)

N/A: not applicable; N: number of participants.

Figure legend

Figure 1. Flow diagram

Supplementary Tables

Supplementary Table 1. Coding Frameworks

Supplementary Table 2. Number of responses, codes, percent exact agreement and Kappa (95% Confidence Interval) for the level of agreement between reviews for coding a random sample of responses

N: number of responses coded; k: kappa coefficient; CI: confidence interval.

Supplementary Table 3. Examples of participants' open-ended responses regarding 'words or feelings' (question 1) across labels (top 10 codes only)

P: participant.

Supplementary Table 4. All treatment themes across labels

N: number of participants.

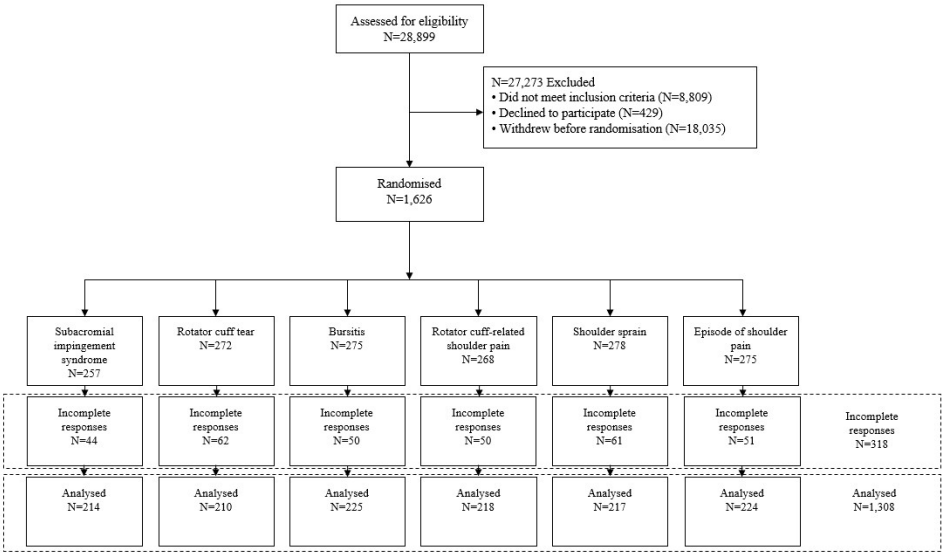

Figure 1. Flow diagram

303x174mm (96 x 96 DPI)

Supplementary Table 1. Coding frameworks

Questions 1: When you hear the term [one of the six labels], what words or feelings does this make you think of?

Code	Explanation	Examples
Activity restriction	Any reference to being unable to do typical daily activities	Caution, light work, rest, sleep loss, time off work, careful
Aging	Any reference to the condition being due to aging	Old, getting old/older, ancient
Psychological distress	Any reference to feelings of fear, anxiety, worry or stress	Fear, anxious, worry, stress, scared, depressed, nervous, etc.
Feels dismissed	Any reference to feeling dismissed by another person	Not interested in my opinion, not bad to those who don't suffer from it, not real, made up
Good prognosis	Any reference to the condition recovering either quickly or without treatment	Temporary, no treatment needed, heal over time
Irrelevant response	The response did not address the question	"Nothing at all", "I don't really have any feelings"
Mechanism of injury	Any reference to why the pain started	Injury, overuse issue, caused by lifting, sports injury
Minor issue	Any reference to the condition being 'non-serious'	Not serious, everyday issue, common, annoyance, uncomfortable, inconvenient
Pain experience	Any reference to pain	Pain, hurt, intermittent, discomfort, recurrent
Poor prognosis	Any reference to the condition taking a long time to recover	Persistent pain, long recovery, long-term issue
Serious issue	Any reference to the condition being 'serious'	Deteriorating, serious, bad, very ill
Tissue damage or dysfunction	Any reference to tissue damage or dysfunction	Tendon tear, arm out of place, sprained ligaments, pulled muscle, stiffness, weakness
Treatment/ investigation	Any reference to the need for treatment or investigation	Rest, pain medication, heat, surgery, physiotherapy, requires imaging
Uncertainty	Any reference to being unsure what the label means	Complicated, confused, uncertainty, need more information
Unhappy/ frustration	Any reference to being unhappy or frustrated	Sad, anger, annoyed, feel bad, upset, helpless, useless

Question 2: What treatment (s) (if any) do you think a person with [one of the six labels] needs?

Code	**Examples (if needed)**
Activity modification	Avoid lifting, avoid aggravating activities, avoid strenuous activities
Acupuncture	
Chiropractor	
Cognitive behavioural therapy	
Cold	
Compression	
Diet	
Doctor	
Electrotherapy	Laser, ultrasound
Elevation	
Emergency department/hospital	
Ergonomics/posture	Adjust computer screen height
Exercise	
Good mattress	
Heat	
Hydrotherapy	
Immobilisation	Sling
Injection	Cortisone injection
Investigations	X-ray, ultrasound, MRI
Light exercise	Gentle exercise, exercise but be careful
Manipulation	
Massage	
Medication	Panadol, anti-inflammatories, muscle relaxants, supplements
Irrelevant response	
Natural or unknown therapies	Stone therapy, finger therapy, natural remedies, tea, spa baths
No treatment	Time, patience, will heal itself in time
Normal movements	Keep arm moving, normal activity, stay active
Osteopathy	
Pain clinic	
Physiotherapy	
Prayer/hope/meditation	
Rest	Taking it easy, relaxation, reduce overall activity
Second opinion	
Specialist	
Stay healthy	Good sleep, avoid smoking
Surgery	
Taping/bracing	Brace, strapping
Time off work	

Topical treatments	Ointment, rub, Voltaren gel, oils
Unsure	
Wait and see	

Supplementary Table 2. Number of responses, codes, percent exact agreement and Kappa (95% Confidence Interval) for the level of agreement between reviews for coding a random sample of responses

Feelings about label	**N (%)**	**Codes**	**Agreement**	**k**	**95% CI**
All labels	300 (22.9)	562	93.9%	0.93	0.90-0.95
Subacromial impingement syndrome	50 (23.4)	90	94.3%	0.93	0.86-0.98
Rotator cuff tear	50 (23.8)	96	91.6%	0.90	0.82-0.97
Bursitis	50 (22.2)	86	93.3%	0.92	0.84-0.98
Rotator-cuff-related shoulder pain	50 (22.9)	87	97.3%	0.97	0.91-1.00
Shoulder sprain	50 (23.0)	111	93.8%	0.92	0.86-0.98
Episode of shoulder pain	50 (22.3)	92	93.3%	0.92	0.85-0.98
Treatment for label	**N (%)**	**Codes**	**Agreement**	**k**	**95% CI**
All labels	300 (22.9)	586	94.4%	0.94	0.92-0.96
Subacromial impingement syndrome	50 (23.4)	94	93.3%	0.93	0.87-0.98
Rotator cuff tear	50 (23.8)	99	94.7%	0.94	0.88-0.99
Bursitis	50 (22.2)	89	97.8%	0.97	0.94-1.00
Rotator-cuff-related shoulder pain	50 (22.9)	93	95.7%	0.95	0.90-0.99
Shoulder sprain	50 (23.0)	108	93.9%	0.93	0.88-0.98
Episode of shoulder pain	50 (22.3)	103	92.0%	0.91	0.85-0.97

N: number of responses coded; k: kappa coefficient; CI: confidence interval.

Supplementary Table 3. Examples of participants' open-ended responses regarding 'words or feelings' (question 1) across labels (top 10 codes only)

Subacromial impingement syndrome	Rotator cuff tear	Bursitis	Rotator-cuff-related shoulder pain	Shoulder sprain	Episode of shoulder pain
Pain experience					
"Unbearable pain." *[P130, Female, age 40]* "I think that it is pain and very uncomfortable." *[P121, Male, age 45]*	"Very uncomfortable to have." *[P329, Female, age 65]* "Painful, agony." *[P331, Male, age 49]*	"Pain in the shoulder area." *[P520, Male, age 79]* "Pain, swelling, redness." *[P559, Female, age 49]*	"Pain & discomfort." *[P797, Male, age 69]* "Pain that incurs when moved." *[P682, Female, age 38]*	"Tingling, hot sensation, pain on lifting arm up." *[P1044, Female, age 58]* "Pain in shoulder hurting bad." *[P869, Male, age 64]*	"Aching pain throbbing." *[P1120, Male, age 34]* "Very, very sharp pains." *[P1085, Female, age 32]*
Tissue damage or dysfunction					
"Bones trapping tendons/muscles." *[P188, Female, age 28]* "Something pressing in the shoulder. Seizing and/or swelling." *[P208, Male, age 38]*	"Shoulder tear that hurts real bad." *[P236, Female, age 60]* "I have tendon damage." *[P341 , Male, age 48]*	"Fluid sac that is maybe torn or ruptured." *[P577, Female, age 56]* "Inflammation in the shoulder." *[P533, Male, age 45]*	"An injury to muscles." *[P821, Female, age 63]* "Sounds like it is in the area of the shoulder joint. Makes me think there is inflammation or perhaps a pinched nerve."	"A muscle sprain or pinched nerve." *[P922, Male, age 65]* "You didn't break anything you just sprained the ligaments or muscles." *[P1080, Female, age 69]*	"I think if things like a trapped nerve or general injury to the area." *[P1259, Female, age 41]* "Tendon, muscle and all this other pain." *[P1129, Male, age 26]*

			[P837, Male, age 61]		
Activity restriction					
"Pain, being uncomfortable, not being able to do the things you normally do." *[P200, Female, age 63]* "Disability, not being able to work or do activities." *[P106, Male, age 21]*	"I'm useless on one side." *[P243, Male, age 58]* "It's painful and hard to function day to day." *[P267, Female, age 39]*	"Pain and trouble with movement." *[P593, Male, age 42]* "Inflammation, pain, decrease range of motion." *[P569, Female, age 30]*	"Something painful they may limit the ability to move your arm in the way you are accustomed to doing things." *[P792, Female, age 63]* "Annoying restriction to movement." *[P866, Male, age 66]*	"Limited movement." *[P960, Female, age 67]* "Take more care in the things I do." *[P1054, Male, age 60]*	"Affects my everyday actions" *[P1189, Male, age 68]* "Hard to do normal things" *[P1294, Female, age 68]*
Psychological distress					
"Pain, stress, anxious." *[P25, Male, age 64]* "Pinched nerve, sounds scary." *[P145, Female, age 45]*	"Bad feeling, is very not cool." *[P238, Male, age 38]* "The term rotator cuff tear sounds scary." *[P256, Female, age 29]*	"A little scared, because if you don't get it fixed right away, it'll cause stiff shoulder disease." *[P564, Male, age 34]* "It sounds quite scary."	"Scared - what if I lose use of my shoulder?" *[P741, Female, age 37]* "Makes me worried." *[P701, Male, age 38]*	"That I am getting weaker. To sprain my shoulder whilst doing a simple task worries me a little." *[P1050, Female, age 62]* "Scarred, worried, confused." *[P985, Male, age 19]*	"That my body might possibly be deteriorating, perhaps seriously. I would be quite concerned. Anxious, worried." *[P1218, Male, age 47]* "Anxious, teary, worried, troubled"

		[P445, Female, age 46]			*[P1088, Female, age 62]*
Good prognosis					
"Pain which will subside with time. Healing over time if care taken." *[P134, Male, age 69]* "Temporary pain in the shoulder blade." *[P166, Female, age 28]*	"It just needs time to repair itself." *[P407, Female, age 64]* "It sounds threatening, but I am sure this can be recovered during reasonable period of time." *[P395, Male, age 45]*	"Inflammation. Pain eventual recovery." *[P532, Female, age 57]* "Temporary shoulder pain that will just go away." *[P602, Male, age 47]*	"Great now but with the time it cures and no need of doing anything let time show magic." *[P730, Male, age 33]* "Not serious, will heal itself, relax." *[P745, Female, age 65]*	"Strain which eventually will heal itself." *[P1040, Male, age 79]* "Temporary pain from something strenuous I tried to do." *[P1067, Female, age 69]*	"Temporary. Not very serious. Annoying." *[P1271, Female, age 36]* "Short term pain" *[P1273, Male, age 47]*
Uncertainty					
"What the hell is that? Can't they speak in simple terms?" *[P129, Male, age 61]* "Complicated, serious, nervous." *[P114, Female, age 32]*	"I am not sure actually about this except that fact that it is related to shoulder." *[P272, Female, age 34]* "Pain, uncertainty." *[P378, Male, age 68]*	"No idea, something common." *[P565, Male, age 47]* "Do not know what it is." *[P627, Female, age 40]*	"It sounds complicated." *[P858, Female, age 71]* "Not sure what to do at all very sorry but I will go to the therapy." *[P662, Male, age 49]*	"Scarred, worried, confused." *[P985, Male, age 19]* "Honestly it first time I see this world and really I can't guess what it is but it still doesn't mean a serious issue." *[P955, Female, age 41]*	"Episode of shoulder pain is too vague of a term. When I hear it, I want more definitive answers and diagnostic." *[P1144, Male, age 25]* "Does not give a good cause, not a very good name."

					[P1210, Female, age 36]
Minor issue					
“The injury is probably just due to overextending my arm, it is not too serious and should get better.” *[P180, Female, age 38]* “Not sure maybe a slight disorder.” *[P113, Female, age 20]*	“Shoulder pain in the short-term mild discomfort.” *[P405, Male, age 51]* “This is not a serious medical condition. I will recover reasonably soon.” *[P399, Female, age, 41]*	“Words and feelings that come to mind is not to worry.” *[P640, Female, age 24]* “Not as bad as it could have been.” *[P498, Male, age 44]*	“Simple pain, no injury.” *[P775, Male, age 21]* “Painful but not serious.” *[P820, Female, age 36]*	“That it is nothing too serious, just needs rest and gentle exercise.” *[P1073, Male, age 75]* “Temporary, not serious, will improve with time.” *[P1051, Female, age 67]*	“A minor injury with some discomfort *[P1231, Male, age 61]* "Will not stay long. Will cures by itself and no need for medicine” *[P1249, Female, age, 47]*
Treatment/investigation					
"It is pretty serious I may need surgery." *[P129, Male, age 61]* "It sounds like a serious condition and I thought that surgery is require to fix it." *[P51, Female, age 31]*	“Pain, off work, surgery.” *[P420, Male, age 36]* “Shoulder, muscle, surgery, orthopaedics, throwing.” *[P308, Female, age 23]*	“Infection or inflammation that can be treated.” *[P635, Female, age 62]* “A little scared, because if you don't get it fixed right away, it'll cause stiff shoulder disease.” *[P564, Male, age 34]*	“Need to attend very quickly.” *[P774, Male, age 38]* “Long term discomfort, need for exercise regime.” *[P790, Female, age 76]*	“Pain, doctors, sling, X-rays, medication.” *[P910, Female, age 44]* “Damn, now I have to go through physical therapy.” *[P890, Male, age 21]*	“If it persisted for some time, I would visit a doctor and go from there.” *[P1296, Male, age 66]* “It makes me realise that my health professional should point me in the right direction to enable me to help myself.” *[P1209, Female, age 71]*

Unhappy/frustration					
"Fear, anxious, angry, tired." *[P30, Male, age 35]* “Sad, living in pain isn’t fun.” *[P87, Female, age 47]*	“Disgusting pain, unhappy, sad, mad.” *[P300, Male, age 23]* "Causing me to be unhappy when I cannot reach. Causing me to be unhappy when I cannot carry items." *[P351, Female, age 71]*	"Fear, hurt, angry.” *[P446, Male, age 23]* “Pain, stress, anger." *[P452, Female, 42]*	“Frustrated, annoyed, anxious, nervous.” *[P663, Male, age 20]* "Muscular, hurts more when I try and sleep, frustrating, can't do my normal activities." *[P796, Female, age 53]*	“Frustrated, tired.” *[P966, Female, 47]* “Limitations, pain, frustration.” *[P899, Male, age 23]*	“Painful, tiredness, unhappy” *[P1305, Female, age 56]* “Pissed off anxious and angry” *[P1133, Male, age 33]*
Serious issue					
“It sounds scary and serious.” *[P95, Female, age 54]* "Sounds like very serious injury." *[P58, Male, age 39]*	“Serious condition.” *[P301, Female, age 65]* “It sounds very serious.” *[P268, Male, age 25]*	“Serious condition, something has burst, worried.” *[P620, Female, age 33]* “Inflamed area within the body that could harm the human body.” *[P506, Male, age 49]*	“Serious, long term injury.” *[P826, Female, age 38]* “Sounds bad and sounds like it would hurt a lot and might need surgery to fix.” *[P695, Male, age 45]*	“It’s really bad because the stress is here, you think like you got something anywhere else that’s more serious.” *[P875, Male, age 25]* “It could be cancer.” *[P1066, Female, age 46]*	“That my body might possibly be deteriorating, perhaps seriously.” *[P1218, Male, age 47]* “Hurt, shoulder, arm, cancer” *[P1213, Prefer not to say gender, age 26]*

P: participant.

Supplementary Table 4. All treatment themes across labels

Subacromial impingement syndrome (n=214)		Rotator cuff tear (n=210)		Bursitis (n=225)		Rotator-cuff-related shoulder pain (n=218)		Shoulder sprain (n=217)		Episode of shoulder pain (n=224)	
Theme	**N (%)**	**Theme**	**N (%)**	**Theme**	**N (%)**	**Theme**	**N (%)**	**Theme**	**N (%)**	**Theme**	**N (%)**
Rest	59 (27.6%)	Physiotherapy	49 (23.3%)	Medication	69 (30.7%)	Medication	61 (28.0%)	Medication	71 (32.7%)	Medication	83 (37.1%)
Physiotherapy	51 (23.8%)	Rest	47 (22.4%)	Rest	63 (28.0%)	Physiotherapy	52 (23.9%)	Rest	55 (25.3%)	Physiotherapy	56 (25.0%)
Medication	48 (22.4%)	Surgery	40 (19.0%)	Activity modification	31 (13.8%)	Surgery	40 (18.3%)	Physiotherapy	43 (19.8%)	Rest	42 (18.8%)
Activity modification	38 (17.8%)	Medication	36 (17.1%)	Exercise	31 (13.8%)	Exercise	34 (15.6%)	Exercise	43 (19.8%)	Exercise	34 (15.2%)
Injection	25 (11.7%)	Activity modification	30 (14.3%)	*Exercise (intensity not specified)*	16 (7.1%)	*Exercise (intensity not specified)*	25 (11.5%)	*Exercise (intensity not specified)*	32 (14.7%)	*Exercise (intensity not specified)*	19 (8.5%)
Exercise	25 (11.7%)	Exercise	26 (12.4%)	*Light exercise*	15 (6.7%)	*Light exercise*	9 (4.1%)	*Light exercise*	11 (5.1%)	*Light exercise*	15 (6.7%)
Exercise (intensity not specified)	19 (8.9%)	*Exercise (intensity not specified)*	15 (7.1%)	Physiotherapy	30 (13.3%)	Rest	34 (15.6%)	Heat	33 (15.2%)	Heat	24 (10.7%)
Light exercise	6 (2.8%)	*Light exercise*	11 (5.2%)	Injection	22 (9.8%)	Activity modification	19 (8.7%)	Cold	25 (11.5%)	Massage	22 (9.8%)
Surgery	21 (9.8%)	Heat	16 (7.6%)	Heat	20 (8.9%)	Injection	16 (7.3%)	Activity modification	20 (9.2%)	Injection	21 (9.4%)
Unsure	17 (7.9%)	Unsure	16 (7.6%)	Cold	18 (8.0%)	Investigations	16 (7.3%)	Massage	17 (7.8%)	Investigations	20 (8.9%)
Heat	14 (6.5%)	Wait and see	13 (6.2%)	Normal movements	16 (7.1%)	Irrelevant response	12 (5.5%)	Surgery	16 (7.4%)	Activity modification	18 (8.0%)
Doctor	12 (5.6%)	Injection	12 (5.7%)	Unsure	15 (6.7%)	Chiropractor	11 (5.0%)	Injection	14 (6.5%)	Cold	18 (8.0%)
Massage	12 (5.6%)	Massage	10 (4.8%)	Doctor	13 (5.8%)	Massage	11 (5.0%)	Topical treatments	14 (6.5%)	Doctor	14 (6.3%)
Cold	10 (4.7%)	Investigations	9 (4.3%)	Massage	11 (4.9%)	No treatment	11 (5.0%)	Doctor	12 (5.5%)	Topical treatments	14 (6.3%)
Normal movements	9 (4.2%)	No treatment	8 (3.8%)	Surgery	11 (4.9%)	Heat	10 (4.6%)	Unsure	11 (5.1%)	Surgery	13 (5.8%)
Investigations	7 (3.3%)	Normal movements	8 (3.8%)	No treatment	9 (4.0%)	Cold	9 (4.1%)	Investigations	10 (4.6%)	No treatment	8 (3.6%)
No treatment	7 (3.3%)	Topical treatments	7 (3.3%)	Investigations	7 (3.1%)	Normal movements	9 (4.1%)	Chiropractor	6 (2.8%)	Acupuncture	7 (3.1%)
Topical treatments	6 (2.8%)	Cold	6 (2.9%)	Wait and see	6 (2.7%)	Topical treatments	9 (4.1%)	Immobilisation	6 (2.8%)	Chiropractor	6 (2.7%)

Wait and see	6 (2.8%)	Acupuncture	5 (2.4%)	Specialist	5 (2.2%)	Unsure	9 (4.1%)	Irrelevant response	6 (2.8%)	Normal movements	6 (2.7%)
Acupuncture	4 (1.9%)	Doctor	5 (2.4%)	Topical treatments	5 (2.2%)	Doctor	5 (2.3%)	Normal movements	6 (2.8%)	Unsure	6 (2.7%)
Hydrotherapy	4 (1.9%)	Irrelevant response	5 (2.4%)	Electrotherapy	4 (1.8%)	Wait and see	5 (2.3%)	No treatment	5 (2.3%)	Irrelevant response	5 (2.2%)
Irrelevant response	4 (1.9%)	Specialist	5 (2.4%)	Chiropractor	3 (1.3%)	Acupuncture	3 (1.4%)	Wait and see	5 (2.3%)	Immobilisation	4 (1.8%)
Specialist	2 (0.9%)	Taping/bracing	5 (2.4%)	Hydrotherapy	3 (1.3%)	Taping/bracing	3 (1.4%)	Compression	3 (1.4%)	Diet	3 (1.3%)
Chiropractor	1 (0.5%)	Immobilisation	4 (1.9%)	Irrelevant response	3 (1.3%)	Diet	1 (0.5%)	Natural or unknown therapies	3 (1.4%)	Manipulation	2 (0.9%)
Compression	1 (0.5%)	Chiropractor	2 (1.0%)	Natural or unknown therapies	3 (1.3%)	Hydrotherapy	1 (0.5%)	Acupuncture	2 (0.9%)	Second opinion	2 (0.9%)
Ergonomics/posture	1 (0.5%)	Compression	2 (1.0%)	Prayer/hope/meditation	2 (0.9%)	Immobilisation	1 (0.5%)	Elevation	2 (0.9%)	Wait and see	2 (0.9%)
Good mattress	1 (0.5%)	Diet	2 (1.0%)	Taping/bracing	2 (0.9%)	Manipulation	1 (0.5%)	Taping/bracing	2 (0.9%)	Natural or unknown therapies	1 (0.4%)
Natural or unknown therapies	1 (0.5%)	Time off work	2 (1.0%)	Time off work	2 (0.9%)	Pain clinic	1 (0.5%)	Electrotherapy	1 (0.5%)	Osteopathy	1 (0.4%)
Taping/bracing	1 (0.5%)	Cognitive behavioural therapy	1 (0.5%)	Acupuncture	1 (0.4%)	Natural or unknown therapies	1 (0.5%)	Emergency department/hospital	1 (0.5%)	Prayer/hope/meditation	1 (0.4%)
Time off work	1 (0.5%)	Manipulation	1 (0.5%)	Compression	1 (0.4%)	Osteopathy	1 (0.5%)	Ergonomics/posture	1 (0.5%)	Specialist	1 (0.4%)
Cognitive behavioural therapy	0 (0.0%)	Second opinion	1 (0.5%)	Elevation	1 (0.4%)	Prayer/hope/meditation	1 (0.5%)	Hydrotherapy	1 (0.5%)	Taping/bracing	1 (0.4%)
Diet	0 (0.0%)	Electrotherapy	0 (0.0%)	Emergency department/hospital	1 (0.4%)	Second opinion	1 (0.5%)	Manipulation	1 (0.5%)	Stay healthy	1 (0.4%)
Electrotherapy	0 (0.0%)	Elevation	0 (0.0%)	Ergonomics/posture	1 (0.4%)	Specialist	1 (0.5%)	Prayer/hope/meditation	1 (0.5%)	Cognitive behavioural therapy	0 (0.0%)
Elevation	0 (0.0%)	Emergency department/hospital	0 (0.0%)	Immobilisation	1 (0.4%)	Time off work	1 (0.5%)	Specialist	1 (0.5%)	Compression	0 (0.0%)

Emergency department/hospital	0 (0.0%)	Ergonomics/posture	0 (0.0%)	Osteopathy	1 (0.4%)	Cognitive behavioural therapy	0 (0.0%)	Time off work	1 (0.5%)	Electrotherapy	0 (0.0%)
Immobilisation	0 (0.0%)	Good mattress	0 (0.0%)	Stay healthy	1 (0.4%)	Compression	0 (0.0%)	Stay healthy	1 (0.5%)	Elevation	0 (0.0%)
Manipulation	0 (0.0%)	Hydrotherapy	0 (0.0%)	Cognitive behavioural therapy	0 (0.0%)	Electrotherapy	0 (0.0%)	Cognitive behavioural therapy	0 (0.0%)	Emergency department/hospital	0 (0.0%)
Pain clinic	0 (0.0%)	Pain clinic	0 (0.0%)	Diet	0 (0.0%)	Elevation	0 (0.0%)	Diet	0 (0.0%)	Ergonomics/posture	0 (0.0%)
Osteopathy	0 (0.0%)	Natural or unknown therapies	0 (0.0%)	Good mattress	0 (0.0%)	Emergency department/hospital	0 (0.0%)	Good mattress	0 (0.0%)	Good mattress	0 (0.0%)
Prayer/hope/meditation	0 (0.0%)	Osteopathy	0 (0.0%)	Manipulation	0 (0.0%)	Ergonomics/posture	0 (0.0%)	Pain clinic	0 (0.0%)	Hydrotherapy	0 (0.0%)
Second opinion	0 (0.0%)	Prayer/hope/meditation	0 (0.0%)	Pain clinic	0 (0.0%)	Good mattress	0 (0.0%)	Osteopathy	0 (0.0%)	Pain clinic	0 (0.0%)
Stay healthy	0 (0.0%)	Stay healthy	0 (0.0%)	Second opinion	0 (0.0%)	Stay healthy	0 (0.0%)	Second opinion	0 (0.0%)	Time off work	0 (0.0%)

N: number of participants.

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Evidence
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Pg1.
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Pg2.
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Pg4-5. Introduction
Objectives	3	State specific objectives, including any prespecified hypotheses	Pg 5.
Methods			
Study design	4	Present key elements of study design early in the paper	Pg 5-6. Study design
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Pg6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	Pg 6. Participants and recruitment
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Pg6-7. Data collection
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Pg6-7. Data collection
Bias	9	Describe any efforts to address potential sources of bias	Pg 10-11. Data analysis
Study size	10	Explain how the study size was arrived at	Pg 6. Participants and recruitment
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Pg 10-11. Data analysis
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Pg 10-11. Data analysis

		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	N/A
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Pg 11. Results
		(b) Give reasons for non-participation at each stage	Pg 11.
		(c) Consider use of a flow diagram	Figure 1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	N/A
		(b) Indicate number of participants with missing data for each variable of interest	N/A
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	N/A
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	*N/A*
		Cross-sectional study—Report numbers of outcome events or summary measures	Pg 12-13. Results
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	N/A
		(*b*) Report category boundaries when continuous variables were categorized	N/A
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Pg 13-14. Discussion.
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Pg 14-15.
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pg13-18
Generalisability	21	Discuss the generalisability (external validity) of the study results	Pg13-18

Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Pg20.

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.